

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

For each alternative, the potential direct and indirect impacts (those that occur later in time or farther removed in distance) on each of the affected components of the human environment are described in Sections 4.1 through 4.5. The potential cumulative impacts of the alternatives are described in Section 4.6.

It is difficult to assess the full ramification of any of the alternatives considered because of a data-poor environment in relation to several of the environmental resource categories. Where data are lacking, a qualitative assessment of the possible consequences is presented.

4.1 Alternative 1: No Action

Alternative 1 is to take no federal action; that is, no federal management measures would be recommended by the Council at this time.

Under this and all other alternatives, the State of Hawaii's bottomfish management measures, which were established in 1998 under Department of Land and Natural Resources (DLNR) administrative rule (HAR Chapter 13-94) may remain in place or could be changed by DLNR. The state's current bottomfish management regime includes: (i) 19 Bottomfish Restricted Fishing Areas (BRFAs) throughout the MHI, (ii) a recreational bag limit of 5 ehu and/or onaga per trip per person, (iii) required bottomfish vessel registration, and (iv) prohibited use of bottom longline, nets, traps, and trawls to take bottomfish. Seven species, including deep-slope snappers and a grouper, were identified for management under the state regulations. The state's current BRFAs were delineated according to bottom topography, location of reported bottomfish landings, proximity to access points and points of observation for ease of enforcement, and recommendations from fishermen, with the primary purpose being to protect critical bottomfish habitat and presumed spawning and nursery habitat areas.

This alternative would also allow continued open access for entry into the MHI fishery, and commercial fishermen would continue to be required to submit catch reports. Recreational fishermen would continue not to be required to submit catch reports, and the recreational catch component would continue to be unknown.

Based on new mapping information of bottomfish habitat, HDAR is in the process of reviewing its bottomfish management regime, with a focus on the BRFAs. According to HDAR, the proposed changes to the BRFAs include reducing their number, modifying their locations, standardizing their boundaries to corresponding minutes of latitude and longitude, and increasing their size. Factors being considered by HDAR include facilitating GPS navigation around BRFAs, locating BRFAs close to shore to facilitate monitoring and enforcement, increasing habitat protection, and supporting larval transport and recruitment between banks and islands. Also under consideration are modifications to HDAR's existing Commercial Fisheries Statistical Area reporting grids to allow for better evaluation of the effectiveness of existing and new BRFAs. As detailed in Section 3.4.3.2.2, there are numerous shortcomings associated with the existing commercial fisheries statistical reporting grid system in relation to bottomfish habitat

and location of BRFA's. The current shortcomings do not allow for evaluation of the BRFA's effectiveness. Problems include BRFA boundaries that straddle multiple reporting grids or occupy only a portion of a single grid and reporting grid boundaries that parallel or are adjacent to 100-fathom depth contour lines.

According to HDAR, potential changes to its administrative rules regarding the BRFA's may be finalized in late 2006. As currently described, these changes would modify the 19 existing BRFA's into 12 larger BRFA's dispersed throughout the MHI.

Absent new State actions, federal action by the Secretary of Commerce would be required to end the bottomfish overfishing.

4.1.1 Target Species

Uncertainty about the effectiveness of the State's existing RFAs, about the final configuration of any new RFAs (and related changes to existing area closures) and fishermen's responses to them, as well as uncertainty about trends in factors external to the fishery management regime (such as market demand and prices for fresh MHI bottomfish), hamper reliable estimations of future fishing activity. However it can be reasonably anticipated that catches of target species will be reduced if prime fishing areas are designated as new RFAs.

Absent new State actions, short-term fishing activities under Alternative 1 would continue as described in Chapter 3. If the trend of declining commercial fishing activity, apparent for the past 20 years, continues, this would lead to an end of overfishing by proxy. There is, however, no reason to assume this scenario would occur as 2004 information indicates that this downward trend may have flattened. Thus fishing pressure (e.g. overfishing) would likely increase at least over the mid-term, as high fuel costs are believed to cause fishermen to switch from trolling to bottomfish fishing. Under this scenario the abundance of target species would further decline and federal action would likely be required to end overfishing. If the overfishing of bottomfish in Hawaii is allowed to continue, the potential is high for reaching an "overfished" state in the bottomfish fishery, which left unchecked could cause the fishery to collapse and require the implementation of a rebuilding plan.

4.1.2 Nontarget Species and Bycatch

Nontarget species are those that are caught incidentally, but retained for consumption or sale. Bycatch are those species that are caught incidentally but are not retained (i.e. discarded).

As described in Section 3.4.6, bycatch is not well reported in the MHI bottomfish fishery, but is believed to be small (8.5 percent of the total catch). Hawaii bottomfish fishing gears are highly selective and skilled bottomfish fishermen target particular species, reducing capture of nontarget species and bycatch.

Fish may be discarded because they are associated with ciguatera poisoning (e.g. kahala), are unpalatable (e.g. moray eels), are damaged (e.g. shark bites), or because they have a shorter shelf life or may fetch a relatively low price in the market (e.g. ulua). Unlike others, commonly

discarded species (i.e. jacks, including ulua and kahala) are believed to not suffer baurotrama (death from air pressure differences) effects when brought up from depth and are often released alive (Kelley and Moffit 2004).

Bycatch rates in the NWHI are not directly comparable to the MHI bottomfish fishery as the latter is primarily a day trip fishery with little chance of catches exceeding available storage space. In addition there is significant recreational effort in the MHI, which may not be as adept at targeting (thus leading to higher catches of nontarget fish) and does not focus on marketable fish (believed to result in less discards of damaged or other unmarketable but still edible fish).

As described in Section 4.1.1, it can be reasonably anticipated that catches of target species will be reduced if prime fishing areas are closed under HDAR's modified BRFAs. If the decline results in a reduced market supply of fresh local bottomfish, currently low priced species may attain a higher value, with an associated greater incentive to land and sell fish that are currently discarded (e.g. butaguchi), thereby leading to possible shifting of commercial targets and concurrent reductions in bycatch.

At recent public meetings and in HDAR's bottomfish survey conducted in 2005, fishermen commented that they are experiencing more frequent catches of the introduced invasive blue line snapper or taape (*Lutjanus kasmira*). Increased catches of this non-indigenous nuisance species, however, are not an immediate management concern.

Under Alternative 1, information would continue to be collected only from the commercial fishery, and the impact of the recreational fishery on nontarget stocks would remain unknown.

4.1.3 Protected Species

General impacts to protected species under Alternative 1 were analyzed in detail in the May 2005 FEIS and are briefly summarized below. For the complete analysis, please refer to Section 4.1.3 of the FEIS. The following discussion summarizes the anticipated impacts from Alternative 1.

ESA Listed Species

Impacts to listed species are mitigated through adherence to the conservation recommendations outlined in the 2002 Biological Opinion issued by NMFS pursuant to the Endangered Species Act of 1973, as amended. In that opinion, NMFS concluded that the bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat. NMFS also found that the bottomfish fishery does not adversely affect any listed whales or sea turtles. Offshore bottomfish fisheries in the MHI are not known to interact with endangered species; however the 2002 Biological Opinion describes several monk seals that have been found with embedded hooks mostly of the type used by the shoreline ulua fishery, but monks seals have also been found with hooks similar to the type used in the bottomfish fishery (NMFS 2002)

Non-ESA Marine Mammals

The Hawaii bottomfish fishery is listed as a Category III fishery under Section 118 of the Marine Mammal Protection Act of 1972. A Category III fishery is one that has a low likelihood or no known incidental takings of marine mammals. Observer data from the NWHI Protected Species Study Zone taken in 1990 to 1993 recorded few interactions between marine mammals (monk seals and bottlenose dolphins) and bottomfish gear, primarily in the form of removal of fish and bait from fishing lines without any hookings or entanglements (Nitta and Henderson 1993). These interactions have been determined by NMFS to constitute a low-level risk to bottlenose dolphins. Observer coverage of the NWHI fishery from 2003 to the present has not recorded any interactions with marine mammals. The MHI offshore bottomfish fishery is believed not to interact with marine mammals.

Seabirds

The NWHI bottomfish fishery observer program recorded three interactions with seabirds in 2003, all of which were disentangled and released. This low level of interactions is expected to continue in the NWHI under the no-action alternative. These interactions may affect a limited number of seabirds; however, they would not be expected to result in impacts to seabird distribution, survival, or population structure. No interactions between seabirds and MHI bottomfish vessels have reported or observed, therefore it is believed MHI bottomfish fishing activities pose little to no threat to Hawaii seabird populations.

4.1.4 EFH, Biodiversity, and Ecosystems

Essential fish habitat (EFH) and habitat areas of particular concern (HAPC) that were designated for all MUS under the Council's existing FMPs are presented in Table 5. Impacts to substrate EFH and HAPC from bottomfish fishing may occur if weighted lines or baited hooks rest on the bottom substrate. This does occur during some bottomfish fishing operations; however larger onaga and opakapaka are often targeted at depths 20 meters from the bottom which reduces the opportunity for gear interactions with the substrate (Kelley and Moffit 2004). Lost fishing gear including anchor lines and anchors from bottomfish fishing activities also have the potential to impact the substrate. Research conducted in the NWHI and MHI found counts of this type of fishing debris to be low at the studied NWHI bottomfish fishing sites (Raita and St. Rogatien Banks), however no data were presented for the MHI sites (Kelley and Moffit 2004).

Potential impacts to water column EFH and HAPC from bottomfish fishing include the activity of sending a weighted handline with baited hooks and a small chum bag to bottom depths generally to 50 fathoms and below (see Section 3.4.2). This activity has been found not to adversely affect the EFH and HAPC of the water column (G. Davis, PIRO, personal communication). The use of chum has been theorized to potentially introduce parasites or disease into the water column however this has not been reported to be a problem in Hawaii's bottomfish fisheries (Kelley and Moffit 2004).

The use of explosives, poisons, trawl nets, and other destructive gears that may adversely affect EFH and HAPC is prohibited under the Bottomfish FMP.

Deep-water precious coral beds designated as EFH or HAPC are well below the depths fished or anchored in by the bottomfish fishery and thus neither direct or indirect impacts from bottomfish fishing activities are expected to affect deep-water precious corals or their habitat. Shallower black coral beds occur within the depth range fished for bottomfish and individual colonies of black coral species and could be damaged or destroyed by anchors or weights on the terminal end of the fishing line. Because black coral has a resilient exoskeleton it is unlikely that it would be damaged by any bottomfish fishing related gear except a direct hit to its base by an anchor (Kelley and Moffit 2004).

Areas of EFH and HAPC for crustacean and coral reef MUS are relatively shallow compared with the typical depths where bottomfish harvests occur. However, when fishing in deeper waters fishermen may anchor their vessels in order to maintain a position over productive fishing areas. Anchoring is generally conducted at depths from 80 to 120 meters (40 to 60 fm). At these depths, anchor damage is believed to be minimal, as much of the habitat consists of a mosaic of sandy low-relief areas and rocky high-relief areas. It is also important to note that the anchor typically used to maintain a vessel's position over a rocky area is constructed of 3/4 in. steel reinforcing rod ("rebar") fashioned in the shape of a four-sided J-hook. Because the rebar is bendable, this design helps prevent the anchor from becoming inextricably lodged on the bottom and has the added benefit of reducing damage to habitat during recovery.

Indirect impacts to water column EFH or HAPC could occur through pollutant discharges from bottomfish fishing vessels. The day-to-day operations of a fishing vessel can produce a number of waste products, including oil, sewage, and garbage that may potentially affect marine habitat. To the extent that these activities and events are subject to environmental regulations, their effects on EFH and HAPC are likely to be avoided, minimized, or mitigated.

The impact of a bottomfish fishing vessel striking the bottom could physically destroy habitat in the immediate area. The possible subsequent breakup of the vessel and release of fuel and oil could result in pollution of habitat and mortality of marine life. Such groundings are rare events, and therefore are not believed to be a significant threat to EFH or HAPC.

For the reasons mentioned above, the continuation of Hawaii bottomfish fisheries under Alternative 1 is not expected to adversely affect the EFH and HAPC for any MUS managed under the FMPs of the Western Pacific Region. Potential changes to the State's BRFAs may further reduce the potential for bottomfish fishing impacts to EFH and HAPC in the MHI.

It is believed that bottomfish fishing activities do not significantly impact bottom-dwelling invertebrates such as cnidarians (e.g. non-reef building corals), sponges, sea stars, and urchins (Kelley and Moffit 2004). The impacts of bottomfish fishing on competitors of target species (e.g. kahala, ulua) are not well understood especially because some species may simultaneously be competitors, predators, prey, and bycatch, but recent studies conducted in the NWHI do not suggest significant impacts to competitors (Kelley and Moffit 2004). The effect of bottomfish fishing on prey availability is also not well understood. However, Kelly and Moffit (2004) found that impacts on prey species are not likely to be significant at the NWHI sites they studied.

The nature of bottomfish fishing in Hawaii as a hook-and-line fishery is considered to have low collateral impacts (Morgan and Chuenpagdee 2003). In addition, existing data from studies in the MHI and NWHI have indicated bottomfish fishing activities are not significantly impacting the deep-benthic ecosystem in terms of bycatch removal, marine debris or derelict fishing gear, biodiversity, and competitor or predator release (Kelley and Moffit 2004). According to a recent interagency study, the coral reef ecosystem of the NWHI has been found to be in “pristine” condition (Maragos and Gulko 2002) despite decades of bottomfish fishing activities in the NWHI.

Under Alternative 1 current bottomfish fishing activities and (lack of) impacts would continue. However potential changes to the State’s BRFA’s may further reduce the potential for bottomfish fishing impacts to ecosystem functions and biodiversity in the MHI.

4.1.5 Fishery Sectors

Uncertainty about the effectiveness of the State’s existing RFAs, about the final configuration of any new RFAs (and related changes to existing area closures) and fishermen’s responses to them, as well as uncertainty about trends in factors external to the fishery management regime (such as market demand and prices for fresh MHI bottomfish), hamper reliable estimations of future fishing activity. However it can be reasonably anticipated that catches of target species will be reduced if prime fishing areas are designated as new RFAs. The distribution of these losses among fishery sectors will largely be a function of where new area closures are located, and the proximity and viability of remaining open areas.

Absent new State action short-term fishing activities under Alternative 1 would continue as described in Chapter 3. If the trend of declining commercial fishing activity, apparent for the past 20 years, continued, this could lead to an end of overfishing by proxy. There is, however, no reason to assume this scenario would occur. Preliminary 2004 information indicates that this downward trend may have flattened.

Fishing pressure (e.g. overfishing) would likely increase at least over the mid-term, as high fuel costs are believed to be causing fishermen to switch from trolling to bottomfish fishing. If this continues, bottomfish stocks and catch rates will further decline and fishery participants in all sectors will see lower returns both in financial and nonmarket (e.g. angler satisfaction, protein sources, and social benefits) terms. If the overfishing of bottomfish in Hawaii is allowed to continue, the potential is high for reaching an “overfished” state in the bottomfish fishery, which left unchecked could cause the fishery to collapse and require the implementation of a rebuilding plan under which little or no bottomfish fishing would be allowed for an extended period of time.

4.1.6 Fishing Communities

As described in Section 3.6.2, on the basis of the requirements of the 1996 SFA amendments to the MSA, the Council designated under its FMPs each of the islands of Kauai, Niihau, Oahu, Maui, Molokai, Lanai, and Hawaii as fishing communities. The impact of Alternative 1 on some or all of these fishing communities would potentially be significant. If the State implements new RFAs that effectively close all available fishing areas within reach of a given community, that

community or those portions thereof that rely on the bottomfish fishery to provide direct and indirect economic and cultural benefits (see Sections 3.6.2.3 to 3.6.2.5) for fishermen and their families, seafood consumers, and the broader island community, will no longer be able to participate in the bottomfish fishery. Absent new State actions, federal action would likely be required to end overfishing. If the overfishing of bottomfish in Hawaii is allowed to continue, the potential is high for reaching an “overfished” state in the bottomfish fishery, which left unchecked could cause the fishery to collapse. An overfished resource and subsequent collapsed fishery would likely result in significant negative impacts on Hawaii’s fishing communities.

4.1.7 Native Hawaiian Community

In the short term, Alternative 1 would allow Native Hawaiians participating in Hawaii’s bottomfish fisheries to fish at current levels and in current locations, thus providing economic and cultural benefits (Sections 3.6.2.3 to 3.6.2.5). Impacts of any new RFAs would vary depending on their size and location. Absent new State actions, federal action would likely be required to end overfishing. If the overfishing of bottomfish in Hawaii is allowed to continue, the potential is high for reaching an “overfished” state in the bottomfish fishery, which left unchecked could cause the fishery to collapse. Under this scenario, the economic and cultural benefits observed from sustainable bottomfish resources for Native Hawaiian communities would cease, thereby negatively impacting the ability of Native Hawaiians to gain economically from catching bottomfish as well as their ability to perpetuate their cultural traditions of fishing and fish sharing among community members.

4.1.8 Administration and Enforcement

Under Alternative 1 the existing management costs of Hawaii’s federal bottomfish fisheries would continue. These include the administration and enforcement costs of management of the NWHI bottomfish fishery with its limited entry system, permit requirements, gear restrictions, and at-sea observer coverage requirements.

4.2 Alternative 2: Area Closures

Alternative 2a: Penguin and Middle Banks (Secondarily Preferred)

Under Alternative 2a, all recreational and commercial fishermen would be prohibited from targeting, possessing, landing, or selling any of the Deep 7 species (onaga, opakapaka, ehu, lehi, gindai, kalekale and hapuupuu) in or from federal waters around Penguin Bank and Middle Bank. All vessel operators (both commercial and recreational) targeting bottomfish in the MHI would be required to register their vessels on an annual basis and would be required to obtain permits as well as to complete and submit catch reports including their catches, fishing effort, and area fished. To facilitate recognition of bottomfish registered vessels from the air, each vessel would be required to be marked on an unobstructed upper surface with its registration number.

This alternative can be implemented by federal action as the Penguin and Middle Banks occur entirely in federal waters (Figure 3). Together these areas represent between 16 percent and 20 percent of MHI bottomfish landings as compared to the 2003 baseline (Kawamoto et al. 2005:

based on 1998-2004 and 1990-2004 data respectively, see Figure 30). The effectiveness of the area closures in reducing bottomfish fishing mortality would be monitored through recreational and commercial reporting as well as enforcement activities.

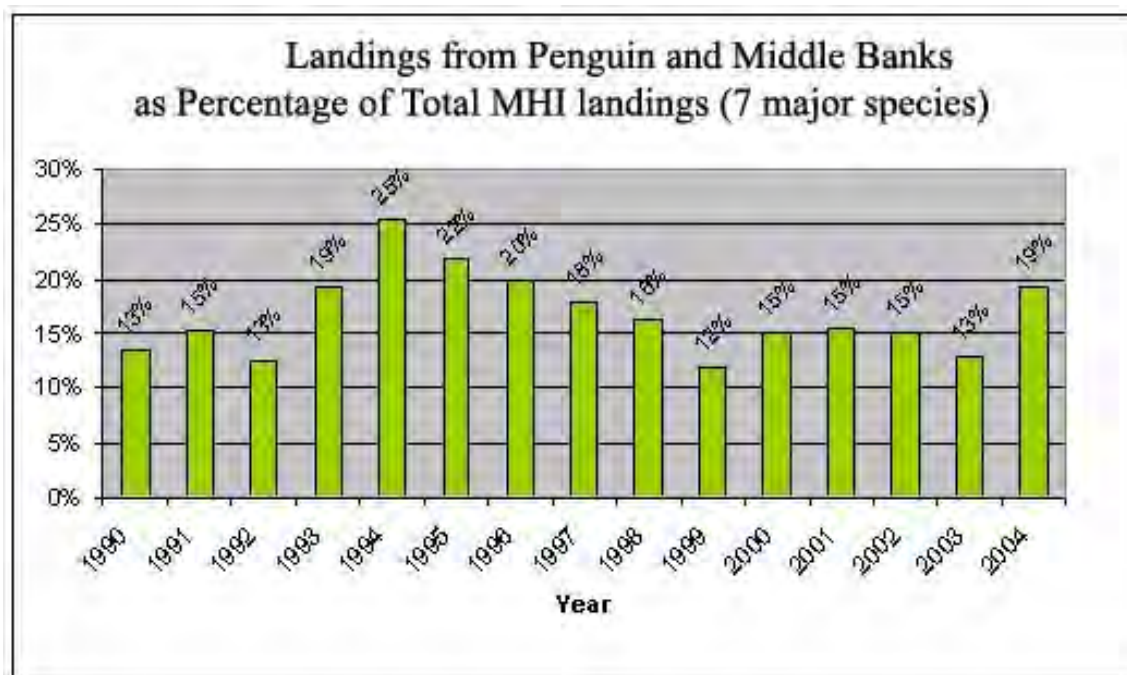


Figure 30: Landings from Penguin and Middle Banks as a Percentage of Total MHI Landings (Deep 7 Species). Source: Kawamoto et al. 2005.

The effectiveness of the closed areas in increasing the stock biomass of the Deep 7 species would be monitored and analyzed through a combination of fishery dependent (i.e. catch reports) and fishery independent data. Fishery independent data would be collected via controlled sampling experiments, submersible surveys, remote cameras (e.g. “Bot-Cam”) and other methodologies.

Alternative 2b: Overlay Federal Closures on Proposed HDAR Restricted Fishing Areas

Under Alternative 2b, all recreational and commercial fishermen would be prohibited from targeting, possessing, landing, or selling any of the Deep 7 species (onaga, opakapaka, ehu, lehi, gindai, kalekale and hapuupuu) in or from federal waters in HDAR’s proposed Bottomfish Restricted Fishing Areas (BRFA). Most of the proposed BRFAs have some component in federal waters (3-200 nm). BRFA P is entirely in federal waters on Penguin Bank. Existing HDAR prohibitions on the use of bottom longline, net, trap, or trawl gear to fish for the Deep 7 species, a recreational bag limit of five onaga/ehu total per fisherman per trip, and a requirement for vessel owners to register their vessels for bottomfish fishing would continue, as amended in the state’s proposed modifications to their MHI bottomfish management plan.

Maps of the current and proposed BRFAs are in Appendix 3. It is estimated that the proposed closures will reduce fishing effort and mortality (landings) by at least 15 percent. The reduction was calculated from commercial fishing data. It is estimated the proposed BRFAs will reduce

recreational fishing effort and mortality as well. HDAR has committed to maintaining this level of fishing mortality reduction as a minimum in their proposal, even if some of the proposed BRFA's may be modified or relocated, as they proceed through their administrative rule process to amend their existing regulations (HDAR 2006).

The assumptions and analysis of the State of Hawaii's proposed revisions to the BRFA's, Alternative 2b, are complex and it is difficult to predict the associated impacts. Although recognized as a valid management tool, there is more uncertainty in predicting the impacts associated with the proposed BRFA revisions when compared to the other alternatives.

4.2.1 Target Species

Alternative 2a would be expected to reduce MHI landings by up to 20 percent (as compared to the 2003 baseline) based on historical from Penguin and Middle Banks (Figure 30). Deepwater bottomfish within the closed areas would be protected but fishing effort (and associated mortality) could be displaced to open areas, thus reducing the potential benefits of the closures. However subsequent mortality rates may be lower if open areas have lower catch rates than Penguin and Middle Banks. The extent of effort moving to open areas is unknown, but several key factors suggest a shifting of effort would likely occur. Oahu bottomfish landings represent approximately 30 percent of the commercial MHI landings (Figure 31), and harvests from Penguin Bank make up a significant proportion of those landings. In addition, because MHI bottomfish tend to command higher aggregate prices than NWHI or imported bottomfish, a shifting of effort to other areas within the MHI is likely to occur.

Middle Bank represents about 0.5 percent of annual MHI bottomfish landings. Because of its location, it is believed that mostly Kauai-based fishermen target bottomfish at Middle Bank. Based on commercial data of the Deep 7 species from 2000 to 2003, landings from Middle Bank were about 5 percent of Kauai landings.

The closure of Penguin and Middle Banks would provide refuge for targeted species to the extent that fish remain in the closed areas. Adult bottomfish are thought to have a relatively limited range, but there is substantial variation in the extent of movement by different species during various life stages. For example, opakapaka is believed to move greater distances than onaga and unlike juvenile opakapaka, which have been found to occupy shallower depths than adults, juvenile onaga and ehu are found in the same depths and habitat as were adults. In addition, tagging studies conducted by HDAR from 1989 to 1994 found that adult opakapaka move extensively within their habitat range and cross deep inter-island channels and move between banks.

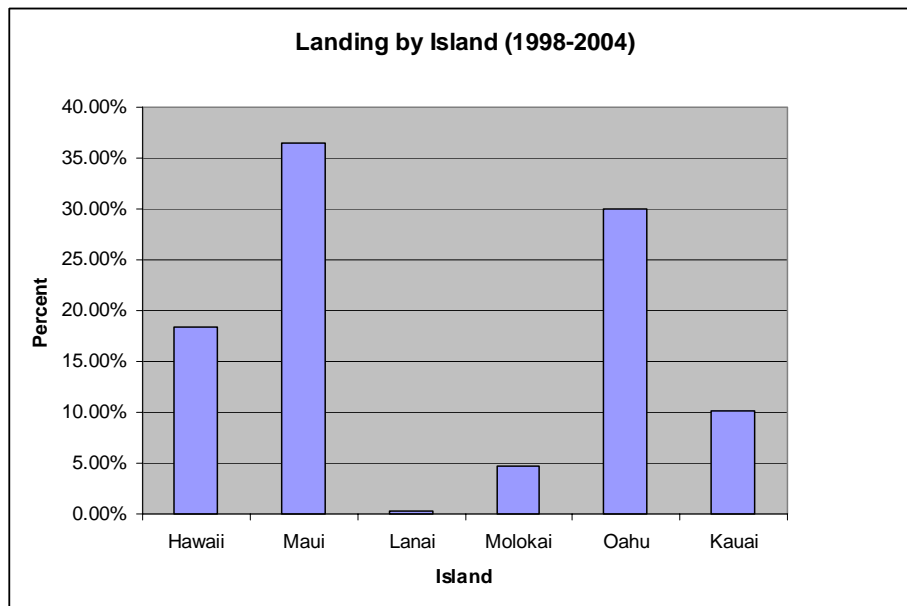


Figure 31: Percentage of MHI Commercial Landings by Island (1998 to 2004). Source: Kawamoto and Tau 2005.

Monitoring the effectiveness of this alternative in reducing fishing mortality would be difficult under the current catch reporting system which uses fairly large reporting grids. This is particularly problematic when Penguin Bank is considered. The edge of the Penguin Bank reporting grid (Grid 331; Figure 32) parallels the bank slope that meanders through prime bottomfish habitat. Adjacent grids, such as Grid 429, include additional bottomfish habitat off the east coast of Oahu. Thus fish reported caught in Grid 429 could have either come from Makapuu Point off of east Oahu or from the western edge of Penguin Bank. However active bottomfish fishermen who frequent Penguin Bank have indicated that all catches taken in the Penguin Bank area are generally reported as coming from Grid 331. In addition, the size of Grid 331 does not allow for finer spatial reporting of fish caught from different locations on Penguin Bank. Without improved spatial reporting, precise estimates of reductions in fishing mortality due to the implementation of area closures would be difficult to achieve.

Reporting requirements for recreational fishermen under Alternative 2a would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having complete information (whether spatially detailed or not) would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

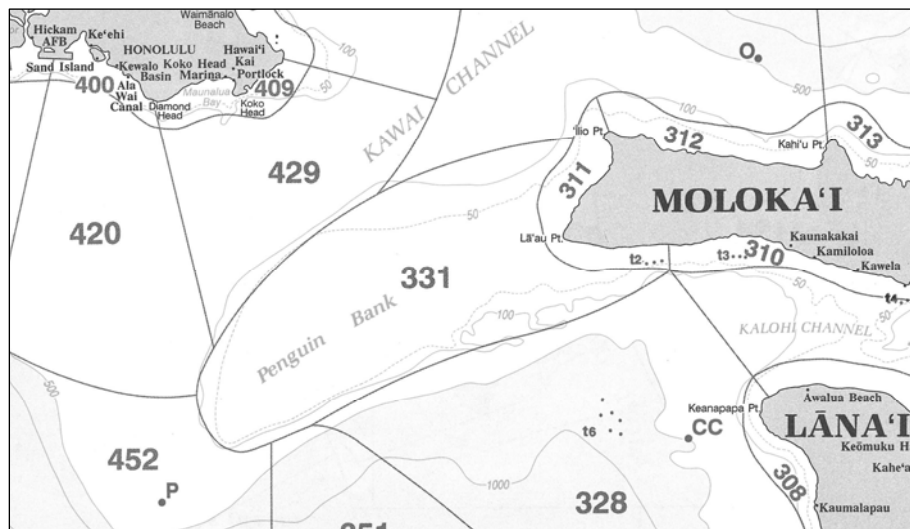


Figure 32: Commercial Fisheries Statistical Chart of Penguin Bank Area.

Alternative 2b: Federal Closures on Proposed HDAR Restricted Fishing Areas

The proposed BRFA's have been estimated by HDAR to reduce fishing mortality by at least 15 percent. Additionally, the bottomfish stock biomass may increase in the closed areas over time, because as according to HDAR, the BRFA's are being sited to protect potentially important habitat areas where the fish aggregate for feeding and spawning (HDAR 2006). Area closures have the potential advantage of providing year-round protection for the target species located within the closed area. Similar to Alternative 2a, this protection is dependent on the degree to which the target species move in and out of the closed areas.

It is expected that some shifting of effort would occur because of the proposed BRFA's. Some of the areas would be situated over currently fished bottomfish grounds and effort would shift to some of the current BRFA's that would be opened or to other open areas. It is difficult to determine the magnitude of the effort shift. However, because the areas that are proposed to be closed by the HDAR were selected based on much improved mapping, habitat, and fishing data, relative to data available when the current BRFA's were established in 1998, the areas that will be closed are estimated to be more effective at protecting quality habitat and may provide increased protection of bottomfish in those areas.

Prior to the establishment and following the implementation of the proposed BRFA's, state and federal agencies will need to develop and implement monitoring methodology that will allow for an accurate determination of how fishing mortality, biomass and size distribution of bottomfish are influenced by the BRFA's. This monitoring will include both fishery-dependent (i.e. commercial and recreational catch reports) and fishery-independent (e.g. baited bottom cameras) components.

4.2.2 Nontarget Species and Bycatch

Under Alternative 2a and 2b the catch of nontarget species as well as bycatch would be eliminated in the closed areas. Assuming that incidental catch rates are consistent throughout the MHI bottomfish fishery, this would achieve up to a 20 percent reduction (compared to the 2003 baseline) in catch of nontarget species. If the associated reduction in catches of target species results in a reduced market supply of fresh local bottomfish, currently low priced species may attain a higher value, with an associated greater incentive to land and sell fish that are currently discarded (e.g. ulua), thereby leading to possible shifting of commercial targets and concurrent reductions in bycatch. In addition, if fishing effort shifts to new or less productive open areas, nontarget catch and bycatch could increase as fishermen explore and discover new fishing grounds or techniques (i.e. shallow-water bottomfish fishing or trap fishing).

As noted in Section 4.2.1, recreational fishermen, in general, are expected to have less targeting skill than commercial fishermen, and therefore may have higher nontarget catches. They should, however, be less influenced by market value and therefore may be expected to retain more nontarget species than commercial fishermen.

Reporting requirements (including information on nontarget catches and bycatch) for recreational fishermen under Alternative 2a and 2b would improve the scientific understanding of influences on nontarget stocks and would be expected to improve fishery management.

4.2.3 Protected Species

In the 2002 Biological Opinion, NMFS concluded that the bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat. NMFS also found that the bottomfish fishery does not adversely affect any listed whales or sea turtles. Offshore bottomfish fisheries in the MHI are not known to interact with endangered or other protected species. The 2002 Biological Opinion mentions that several monk seals that have been found with embedded hooks mostly of the type used by the shoreline ulua fishery, however, monk seals have also been found with hooks similar to the type used in the bottomfish fishery (NMFS 2002). Alternatives 2a and 2b are not expected to result in any significant impacts to listed species or other protected species.

4.2.4 EFH, Biodiversity, and Ecosystems

Alternative 2a would implement an area closure around Penguin Bank and Middle Bank. As discussed in Section 4.1.4 bottomfish fishing activities have been found to not adversely affect EFH and HAPC for any MUS managed under the FMPs of the Western Pacific Region. Bottomfish vessels may potentially impact the environment through groundings or the release of pollutants and the closure of Penguin Bank and Middle Bank would eliminate such potential impacts to those areas. The effect of transferred bottomfish fishing effort and vessel activities from Penguin and Middle Banks to other areas with EFH and HAPC, as well as to other ecosystems, is unknown but not expected to be significant due to the low impacts of this fishery.

Alternative 2b would implement a wide network of area closures throughout the main Hawaiian Islands. The proposed BRFA would enclose more than 765 square kilometers of bottomfish EFH (100 to 400 m depth) as identified by HDAR, of which about 50 percent is in federal waters. According to HDAR, this represents more than 13 percent of the total bottomfish EFH area in the main Hawaiian Islands. HDAR has stated that the proposed BRFA also protect more than 25 percent of Potentially Important Habitat Areas, which are areas identified by HDAR as possessing underwater features such as pinnacles, cliffs, slopes, etc. and believed to be where bottomfish are generally found to aggregate or shelter.

Under Alternatives 2a and 2b, local biodiversity and ecosystems may experience some positive effects because cessation of bottomfish fishing activity within the closed areas by allowing for fish growth, undisturbed spawning, juvenile settlement and grow-out, and other benefits of non-capture within those areas.

4.2.5 Fishery Sectors

As described above, based on historical catches from Penguin and Middle Banks, it is estimated that Alternative 2a would reduce MHI landings of the Deep 7 species by up to 20 percent. There is potential for fishing effort to be displaced to open areas, although the extent of such moves is unknown. Given that approximately 30 percent of the MHI reported commercial bottomfish landings are from Oahu, and that Penguin Bank is the source of 46 percent of these landings, some shifting of effort is anticipated to occur. However, because Penguin Bank is the largest, most productive, and best known bottomfish fishing area around Oahu, it is likely that relocating fishing effort would realize reduced catch rates and thus be less attractive to fishery participants. In addition, those that do relocate would have to fish for longer periods to yield the same catches they are able to achieve from Penguin Bank. The combination of these factors implies that there is unlikely to be a complete replacement of catches due to relocated effort.

Impacts on the commercial, charter, and recreational (including subsistence) fishery sectors would be evenly distributed under Alternative 2a. However, operations based on Oahu and Kauai would be expected to be disproportionately impacted as compared with those on the other islands.

Alternative 2b may negatively impact small boat recreational and commercial fishermen as they may be displaced from their traditional fishing grounds which would be closed under the new BRFA. This may force small boat vessels to travel farther in search of open fishing grounds, which may increase costs for fuel or pose safety risks.

Vessel registration and reporting requirements under Alternative 2a and 2b would represent an ongoing burden for commercial sectors. However, the burden of submitting catch reports for the recreational sector would be new, but not expected to be significant. In the long term the increase in information available to fishery scientists and managers should result in increased fish abundance and improved fishing opportunities.

4.2.6 Fishing Communities

As described above, this alternative would likely have disproportionate effects on the fishing communities of Oahu and Kauai. Closure of these areas may result in Oahu and Kauai fishing communities facing reductions in the direct and indirect economic and cultural benefits (Sections 3.6.2.3–3.6.2.5) for fishermen and their families, seafood consumers, and their broader island community. As fishermen from Oahu and Kauai will likely find new areas to fish or switch to other known bottomfish fishing areas, the direct impact to fishing communities under this alternative is unknown, but is thought to be more negatively substantial for Oahu because of its large population and limited available fishing areas. The Molokai fishing community could be impacted if Oahu vessels displaced from Penguin Bank relocate to areas off Molokai and compete with Molokai bottomfish fishers. Although Penguin Bank is close to Molokai, Molokai fishermen do not often bottomfish there because it is usually crowded with vessels from Oahu and the trip back to Molokai is generally rough due to high seas (Molokai fisherman, personal communication, January 7, 2006 public scoping meeting).

The effects of Alternative 2b on fishing communities is difficult to assess as Hawaii's fishing communities may respond different to the proposed BRFAs. For example, the fishing community of Maui may not be as negatively affected as the Molokai fishing community because the state is proposing to close only one area directly off Maui (near Hana), whereas the Molokai community is facing closures of three nearby bottomfish fishing grounds (i.e. 2nd and 3rd fingers of Penguin Bank, Kalaupapa, and south Molokai). Loss of access to traditional fishing grounds may negatively affect fishing communities as it may deter people from going fishing, thus reducing the social benefits of fish sharing amongst the community. Loss of specialized fishing knowledge within a fishing community can also be viewed as negative as it is a reduction in social capital that is difficult to regain by future generations.

Vessel registration and reporting requirements under Alternative 2a and 2b are not expected to have negative impacts on fishing communities despite the time commitments required. In the long term, positive impacts to fishing communities may occur from more accurate information on how many boats are bottomfish fishing, the amount of bottomfish they catch, and enhanced enforcement capabilities. Improved management of Hawaii's bottomfish would ensure that future opportunities to fish sustainable bottomfish stocks are provided for Hawaii's fishing communities.

4.2.7 Native Hawaiian Community

The impact of a year-around closure of Penguin and Middle Banks under Alternative 2a would likely have similar impacts on Oahu and Kauai Native Hawaiian fishermen as experienced by Oahu and Kauai commercial, recreational, and charter fishing sectors, as well as Oahu and Kauai fishing communities. For Native Hawaiians, however, who once exercised sovereignty and self-determination in the Hawaiian Archipelago, and whose activities were governed by customary and traditional practices, any curtailment or reduction of access rights and cultural practices reduces their ability to practice and continue their culture. The loss of any access and or traditional practice could be viewed as a permanent loss of culture for Native Hawaiian

communities. On the other hand, the objective of the area closures is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiians.

The impacts on Native Hawaiians communities from Alternative 2b are expected to be greater for those communities that are located near a proposed BRFA (e.g. Hana, Waianae, Ka'u). The loss of any access and or traditional practice could be viewed as a permanent loss of culture for those Native Hawaiian communities.

4.2.8 Administration and Enforcement

Administration and enforcement of Alternative 2a and 2b would require the expansion of the current reporting requirements to include requirements for recreational participants. All MHI vessel owners who target bottomfish are already required to register their vessels, however under this alternative they would be required to renew their registration annually. The vessel registration system would need to be expanded accordingly. This will provide current information on the maximum number of fishery participants and ease enforcement by removing the "BF" markings from vessels no longer actively participating in the fishery.

In order to enforce the closed areas under Alternative 2a, additional enforcement actions would be required. As shore-based determination of the origin of MHI bottomfish landed or sold would nearly be impossible, at-sea enforcement and air surveillance by the USCG and NMFS OLE would be necessary to ensure compliance. Penguin Bank is a single large area that is located relatively close to Oahu, which is the base of U.S. Coast Guard (USCG) operations in the area. These factors would facilitate at-sea enforcement of the Penguin Bank closure. Due to its more remote location, Middle Bank would have to be monitored via aerial surveillance by the USCG. According to the USCG District 14 (Honolulu), aerial surveillance is problematic because it is difficult to determine from the air if lines are in the water. At-sea enforcement can also be difficult as well because it may be possible for fishermen to cut their lines and toss any illegal catch overboard prior to an enforcement vessel arriving on the scene. If the regulations prohibited any "BF" vessel from stopping within a closed area, enforcement capabilities would be increased, however this would obviously prevent these vessel operators from targeting shallow-water bottomfish or any other species (e.g. pelagic fish) within the closed areas..

Alternative 2b would also require at sea enforcement and air surveillance by the USCG and NMFS OLE. Problems with the current level of state enforcement for the existing BRFA's have been noted and are primarily related to lack of resources and staff (section 3.4.3.2.3) According to HDAR, there is an incentive to place the proposed BRFA's closer to shore, to the extent possible, and design them with straight-line boundaries, making it easier for both fishermen and enforcement officers to determine whether fishing takes place inside or outside the closed areas. In order to facilitate an adequate enforcement of the closed areas proposed in Alternative 2b, state and federal enforcement agencies would likely have to sign a Joint Enforcement Agreement as well as allow for cross-deputization of state and federal agents. Cross-deputization allows federal agents to enforce state laws and state agents enforce federal laws.

NMFS OLE Pacific Island Division (PID) currently has five agents working in the entire Western Pacific Region, and no enforcement assets (i.e. boats or planes). NMFS OLE PID has indicated that at their currently funding and staffing levels, it would be impossible to adequately enforce Alternative 2b (J. Fogarty, NMFS OLE PID, personal communication). NMFS OLE has suggested that both aerial and at-sea enforcement of multiple small closed areas with open areas in between make is very difficult as it enables cheating as a vessel could quickly enter and exit a closed area. The USCG District 14 has also indicated given their current resources adequate at-sea enforcement as well as air surveillance of the closed areas would nearly be impossible. Both NMFS OLE and the USCG have indicated that moving the BRFA's closure to shore does not facilitate enforcement as indisputable evidence is difficult to gather from shore and boat based operations would still be necessary.

4.3 Alternative 3: Seasonal Closure

Under Alternative 3, an annual summer closure would be implemented from May 1 to August 31 of each year for the entire MHI bottomfish fishery (both commercial and recreational vessels). Targeting, possessing, landing, or selling MHI Deep 7 species would be prohibited during the closed season; however, the NWHI bottomfish fishery would remain open. All vessel operators (both commercial and recreational) targeting bottomfish in the MHI would be required to register their vessels on an annual basis and would be required to complete and submit reports of their catch, fishing effort, and area fished. In addition, each vessel would be required to be marked on an unobstructed upper surface with its registration number. To achieve the needs and objectives of this action (i.e. a 15 percent in MHI fishing mortality), the State of Hawaii would need to establish a parallel summer closure for state waters. The effectiveness of the seasonal closure in reducing bottomfish fishing mortality would be monitored through recreational and commercial reporting as well as enforcement activities.

4.3.1 Target Species

Based on historical MHI landings, an annual MHI closure from May through August would be expected to reduce MHI landings by up to 17 percent as compared to the 2003 baseline (Kawamoto et al. 2005: Figure 33). Deepwater bottomfish throughout the MHI would be protected during the closed season. However, fishing effort could shift to open periods reducing the potential benefits of the closures. The extent of effort shifting to open periods is unknown. However, given that during the open period there would only be the remaining calendar days would be available to fish, combined with the sensitivity of the bottomfish fishery to adverse weather conditions, shifting of effort is expected to be minimal as compared to historical trends. Historically, the highest levels of bottomfish fishing effort occur in the winter months when there is high demand for bottomfish during the holiday season. Market forces may also be an important factor to deter effort if price per pound values drop as a result in market flooding during the open period. In addition, the closure would occur during the time when bottomfish activity has been historically low as fishermen switch to other fisheries. Both the pelagic troll (e.g. yellowfin) and the hook-and-line mackerel (akule and opelu) fisheries are at their peak during the summer period and therefore represent various recreational and commercial fishing opportunities during the bottomfish closed season.

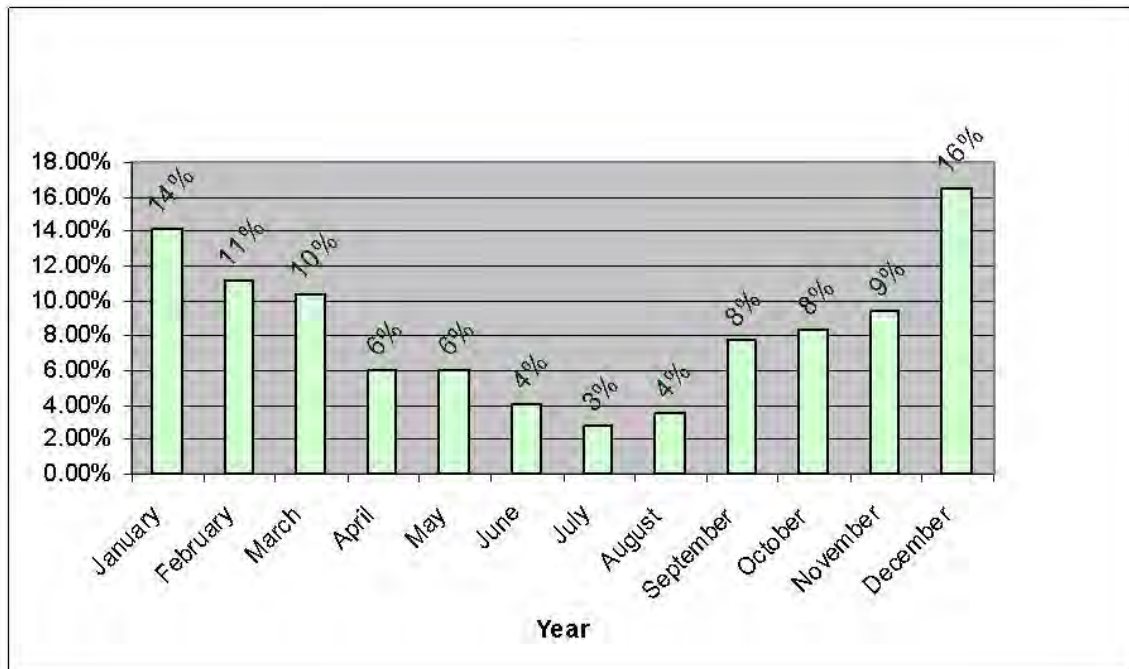


Figure 33: Percentage of MHI Landings by Month (Deep 7 Species). Source: Kawamoto and Gonzales 2005.

Although bottomfish spawn year round, there is evidence that spawning is greatest during the summer months (Haight et al. 1993). An annual May through August closure could provide additional benefits by prohibiting fishing during the peak spawning period and thus reducing fishing mortality of spawning bottomfish.

Reporting requirements for recreational fishermen under Alternative 3 would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having complete information (whether spatially detailed or not) would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

4.3.2 Nontarget Species and Bycatch

Under Alternative 3 the catch of nontarget species and bycatch would be eliminated in the closed season. Regulatory bycatch is not expected because fishermen would most likely not be targeting bottomfish below depths of 30 fm. For example, trolling for uku often occurs at around 15 fm, therefore it would highly unlikely to catch an onaga while trolling for uku. If the associated decline in catches of target species results in a reduced market supply of fresh local bottomfish, currently low priced species may attain a higher value, with an associated greater incentive to land and sell fish that are currently discarded (e.g. ulua), thereby leading to possible shifting of commercial targets and concurrent reductions in bycatch. In addition, if fishing effort shifts to new or less productive open areas, nontarget catches and bycatch could increase as fishermen

explore and discover new fishing grounds or techniques (i.e. shallow-water bottomfish fishing or trap fishing).

As noted in Section 4.2.1, recreational fishermen, in general, are expected to have less targeting skill than commercial fishermen, and therefore may have higher nontarget catches. They should, however, be less influenced by market value and therefore may be expected to retain more nontarget species than commercial fishermen.

Reporting requirements (including information on nontarget catches and bycatch) for recreational fishermen under Alternative 3 would improve the scientific understanding of influences on nontarget stocks and would be expected to improve fishery management.

4.3.3 Protected Species

In the 2002 Biological Opinion, NMFS concluded that the bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat. NMFS also found that the bottomfish fishery does not adversely affect any listed whales or sea turtles. Offshore bottomfish fisheries in the MHI are not known to interact with endangered or other protected species. The 2002 Biological Opinion mentions that several monk seals that have been found with embedded hooks mostly of the type used by the shoreline ulua fishery, however, monk seals have also been found with hooks similar to the type used in the bottomfish fishery (NMFS 2002). Alternative 3 is not expected to result in any significant impacts to listed species or any other protected species.

Limited interactions in the NWHI bottomfish fishery (Section 3.5.4) would have the potential to increase if NWHI fishing activity increased to fill unmet market demand, however this is not anticipated to significantly impact protected species due to the rarity of NWHI interactions and the fact that the NWHI is a limited entry fishery with only eight currently active vessels. Closing down all bottomfish fishing in the MHI during the summer months would be expected to result in fewer MHI bottomfish fishing vessels leaving port during this time period. It is possible that fishery participants would continue to fish by switching to trolling for pelagic species; however NMFS has concluded that the MHI pelagic small-boat (i.e. non-longline) fishery is not likely to jeopardize the continued existence of any listed species (NMFS 2004). The MHI pelagic small-boat fishery is listed as a Category III fishery under the Marine Mammal Protection Act, with a low to no likelihood of interactions with marine mammals. Thus the relocation of MHI bottomfish effort to the pelagic small-boat fishery is not expected to result in any impacts to protected species not already considered.

4.3.4 EFH, Biodiversity, and Ecosystems

As discussed in Section 4.1.4 bottomfish fishing activities have been found to not adversely affect EFH and HAPC for any MUS managed under the FMPs of the Western Pacific Region. Implementing a seasonal closure under Alternative 3 is not expected to adversely affect EFH or HAPC due to the low impacts of this fishery. The potential for increased bottomfish fishing effort in the open season is not expected to significantly affect EFH or HAPC because hook-and-line bottomfish fishing is considered to have low collateral impacts on bycatch and habitat.

Similarly, the impacts of any increased pelagic effort during the closed season are expected to be negligible due to the use of hook-and-line gears in this fishery.

Under Alternative 3 local biodiversity and ecosystems may experience some short term positive effects because cessation of bottomfish fishing activity for the four-month period would allow for fish growth, undisturbed spawning, and other benefits of non-capture.

4.3.5 Fishery Sectors

As described above, based on historical MHI landings, it is estimated that a May–August closure of the MHI bottomfish fishery would result in up to a 17 percent reduction in landings of the Deep 7 species as compared to the 2003 baseline. As with the closed area, fishery participants may increase their fishing during the open season to compensate. However, given that May to August has historically been a time of lower bottomfish fishing activity (Figure 33), significant increases in effort during the open season are unlikely. Immediate impacts of the closure on the commercial, charter, and recreational (including subsistence) fishery sectors would be evenly distributed under Alternative 3. However, because this alternative would lead to an increased reliance on imported bottomfish during the closed season, it would be anticipated to have negative impacts on the entire commercial fishery sector as market channels for fresh MHI bottomfish would be lost and have to be regained each year.

Vessel registration and reporting requirements under Alternative 3 would represent an ongoing burden on all sectors. In the long term the increase in information available to fishery scientists and managers should result in increased fish abundance and improved fishing opportunities.

4.3.6 Fishing Communities

Alternative 3 is not expected to result in significant or disproportionate negative impacts on fishing communities throughout Hawaii. As seen in Figure 34 the summer months between May and August represent the lowest amounts of monthly bottomfish landings, with the winter months of December through February having the highest landings. There would, however, likely be some number of bottomfish fishers from each community who would be negatively impacted by a summer closure as there are those who prefer year-round bottomfish fishing to other types of fishing and others who prefer summer fishing to other times of year. Under this alternative, fishery participants among the state’s fishing communities will be allowed to fish for bottomfish during the remaining eight months of the year and would be able to fish for other types of fish (i.e. troll for ahi) during the summer bottomfish closure. Thus, the direct and indirect economic and cultural benefits (Sections 3.6.2.3 to 3.6.2.5) for fishermen and their families, seafood consumers, and their broader island communities are expected to be generally maintained under this alternative.

Vessel registration and reporting requirements under Alternative 3 are not expected to have negative impacts on fishing communities despite the time commitments required. In the long term, positive impacts to fishing communities may occur from more accurate information on how many boats are bottomfish fishing, the amount of bottomfish they catch, and enhanced enforcement capabilities. Improved management of Hawaii’s bottomfish would ensure that

future opportunities to fish sustainable bottomfish stocks are provided for Hawaii's fishing communities.

4.3.7 Native Hawaiian Community

A May-August bottomfish closure would likely have similar impacts on Native Hawaiian fishermen as by experienced commercial, recreational, and charter fishing sectors, and Hawaii's fishing communities. For Native Hawaiians, however, who once exercised sovereignty and self-determination in the Hawaiian Archipelago, and whose activities were governed by customary and traditional practices, any curtailment or reduction of access rights and cultural practices, albeit for relatively short period during the closure, reduces their ability to practice and continue their culture. The loss of any customary access and practice has resulted could be viewed as a permanent loss of culture for Native Hawaiian communities. On the other hand, the objective of the seasonal closure is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiians. Seasonal restricted fishing periods for a variety of marine organisms were practiced under the ahupuaa system of traditional Native Hawaiian resource management.

4.3.8 Administration and Enforcement

Administration and enforcement of Alternative 3 would require the expansion of the current commercial reporting requirements to include similar requirements for recreational participants. All MHI vessel owners who target bottomfish are already required to register their vessels, however under this alternative they would be required to renew their registration annually. The vessel registration system would need to be expanded accordingly. This will provide current information on the maximum number of fishery participants and ease enforcement by removing the "BF" markings from vessels no longer actively participating in the fishery

Enforcing the summer closed season would require that a parallel closure occur in State waters because shore-based determinations of the origin (i.e. from State vs. federal waters) of MHI bottomfish landed or sold would be impossible. In addition, enforcement of this alternative would require significant shore-based monitoring of landings and sales. This would ensure that only imported bottomfish, or bottomfish harvested by federally permitted NWHI vessels, were sold during the closure period. Without parallel rules, enforcement of Alternative 3 would require extensive at-sea monitoring of federal waters during the closure period.

4.4 Alternative 4: Catch Limits

Alternative 4 includes two variations that would limit the commercial catch of MHI bottomfish. Alternative 4a would establish a fleet-wide total allowable catch (TAC) of bottomfish for all commercial fishing vessels in the MHI, while Alternative 4b would establish vessel-specific individual fishing quotas (IFQs) for Deep 7 bottomfish for all commercial fishing vessels in the MHI. Once either quota was reached, no targeting, possessing, landing or selling of MHI Deep 7 bottomfish (commercial or recreational) would be permitted. The NWHI bottomfish fishery would remain open.

Under both variations, all vessel operators (both commercial and recreational) targeting bottomfish in the MHI would be required to register their vessels on an annual basis and to obtain permits, as well as to complete and submit catch reports including their catches, fishing effort, and area fished. To facilitate recognition of bottomfish registered vessels from the air, each vessel would be required to be marked on an unobstructed upper surface with its registration number.

To achieve the needs and objectives of this action (i.e. a 15 percent in MHI fishing mortality), the State of Hawaii would need to establish a parallel requirement as both State and federal waters would have to be closed once the limit was reached. The effectiveness of the catch limits in reducing bottomfish fishing mortality would be monitored through recreational and commercial reporting as well as enforcement activities.

Alternative 4a: TAC

Under Alternative 4a, a TAC of 198,484 pounds of the Deep 7 species (all species combined), representing a 15 percent reduction from the 2003 fleet-wide MHI bottomfish catches of these species (Kawamoto et al. 2005), would be applied to the entire MHI commercial bottomfish fishery. The bottomfish fishing year would start on October 1 and continue until the TAC was reached. Thereafter, no fishing for Deep 7 bottomfish (commercial or recreational) would be permitted in the MHI. The NWHI bottomfish fishery would remain open.

Alternative 4b: IFQs

Under Alternative 4b, IFQs would be established for each MHI commercial bottomfish fisherman, allowing them to catch 85 percent of their 2003 catch of the Deep 7 species, based on reported landings. The bottomfish fishing year would start on January 1. The number of participants would likely be limited to past participation in the fishery and quota amounts would likely be determined based on individual historical catches. Once a commercial fisherman had landed his respective IFQ, that person would not be permitted to fish for, possess, or sell any bottomfish until the following year. The recreational fishery would remain open.

Each MHI commercial bottomfish participant with an IFQ would be issued a set of non-transferable bottomfish stamps, with each stamp representing a certain number of pounds of bottomfish and all the stamps totaling the fisherman's total IFQ. The fisherman would be required to submit a stamp to the dealer at the point of sale. If the fisherman sold fish in excess of the number of bottomfish pounds for one stamp, he would be required to surrender a second stamp to the dealer. Once all the stamps were submitted the fisherman would be prohibited from fishing until the next open season.

Under this variation, fishermen would be required to continue reporting their catches and to stop fishing when their individual quota was reached. Fishery data would need to be analyzed in real time to ensure that fishermen did not exceed their quota and to penalize those that did.

IFQs could be implemented in a number of ways, two methods are outlined here:

1. Provide equal quotas (totaling 85 percent of the fleet-wide 2003 catch) to all historical participants. Under this alternative, historical highliners would get the same quota as part-time fishermen, and vice versa. Variations could provide equal quotas to a subset of all historical participants, such as those most active in recent years.
2. Provide individual quotas that are equal to 85 percent of each and every fisherman's historical catch. Under this alternative, fishermen's quotas would be relative to their individual historical catches. Variations could provide similar quotas to a subset of all historical participants, such as those most active in recent years.

4.4.1 Target Species

Both options under Alternative 4 would provide direct control of fishing mortality. However, determining appropriate allowable harvest levels on an ongoing annual basis would be difficult as to date not even one comprehensive stock assessment has been completed for this fishery. PIFSC has recently initiated a process to complete a comprehensive stock assessment, however the date of completion is unknown and the assessment model would unlikely be able to predict allowable harvest levels on an annual basis. There is also a paucity of fishery independent data, as well as difficulty in adjusting available CPUE data as highliners leave the fishery. Incorporating the existence of area closures such as the State's RFAs has also proven problematic as the RFAs are generally designed to close the most productive fishing areas, thus reducing available CPUE in remaining open areas.

High-grading would also be a concern under both versions of Alternative 4. High-grading to maximize value can occur within species (e.g. discarding small fish in favor of larger fish) or between species (e.g. discarding low-value species in favor of higher-value species). Deep-slope bottomfish generally have a high mortality rate resulting from embolism as they are brought to the surface. If, and to what extent, high-grading occurs, additional bottomfish mortality may occur.

A quota-based program may also lead fishery participants to make sure that they achieve quotas out of fear that future quotas (or their share of them) may otherwise be reduced. This can result in increased impacts on target species as compared to other management approaches.

As discussed above, either type of quota-based system would be expected to result in some high-grading by species and size. However, high-grading of target species would more likely occur in an IFQ system than in a TAC. Under a TAC system, fishermen would compete against each other and time to land as many of the Deep 7 species as possible before the TAC is filled. This competition would likely discourage discarding of Deep 7 species. Under the IFQ system, fishermen would have the luxury of time to sort through their catch to maximize profit, potentially resulting in increased bycatch rates of, and impacts on, target species.

Reporting requirements for recreational fishermen under Alternative 4 would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having

complete information would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

4.4.2 Nontarget Species and Bycatch

Fishing strategies applied under a TAC or IFQ system are expected to result in different fishing strategies and impacts to targeted species and bycatch. Fishing under a fleet-wide TAC has been observed to create a "race to the fish" in which each fisherman attempts to maximize their individual harvest of the quota species in the shortest time period possible (i.e. before they are harvested by others). Due to limited storage capacity, this may lead to increased discards of less desirable species resulting in higher bycatch rates.

Under an IFQ system, fishermen can catch their quota of the Deep 7 species throughout the year without time constraints or pressure of competition and can limit their fishing to periods of favorable weather or high market prices. An IFQ system could encourage higher retention of nontarget species that could result in a reduction of bycatch. As fishermen know their overall Deep 7 catch will be limited, they will seek opportunities to maximize their fishing time by retaining marketable nontarget species that may have not been previously retained.

As noted in Section 4.2.1, recreational fishermen, in general, are expected to have less targeting skill than commercial fishermen, and therefore may have higher nontarget catches. They should, however, be less influenced by market value and therefore may be expected to retain more nontarget species than commercial fishermen.

Reporting requirements (including information on nontarget catches and bycatch) for recreational fishermen under Alternative 4 would improve the scientific understanding of influences on nontarget stocks and would be expected to improve fishery management.

4.4.3 Protected Species

In the 2002 Biological Opinion, NMFS concluded that the bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat. NMFS also found that the bottomfish fishery does not adversely affect any listed whales or sea turtles. Offshore bottomfish fisheries in the MHI are not known to interact with endangered or other protected species. The 2002 Biological Opinion mentions that several monk seals that have been found with embedded hooks mostly of the type used by the shoreline ulua fishery, however, monk seals have also been found with hooks similar to the type used in the bottomfish fishery (NMFS 2002). Alternatives 4a and 4b are not expected to result in any significant impacts to listed species or any other protected species.

Limited interactions in the NWHI bottomfish fishery (Section 3.5.4) would have the potential to increase if NWHI fishing activity increased to fill unmet market demand, however this is not anticipated to significantly impact protected species due to the rarity of NWHI interactions and the fact that the NWHI is a limited entry fishery with only eight currently vessels. Closing down some or all bottomfish fishing in the MHI once quotas were achieved would be expected to result in fewer MHI bottomfish fishing vessels leaving port until the next fishing season. It is possible

that fishery participants would continue to fish by switching to trolling for pelagic species, however NMFS has concluded that the MHI pelagic small-boat (i.e. non-longline) fishery is not likely to jeopardize the continued existence of any listed species (NMFS 2004). The MHI pelagic small-boat fishery is listed as a Category III fishery under the Marine Mammal Protection Act, with a low to no likelihood of interactions with marine mammals. Thus the relocation of MHI bottomfish effort to the pelagic small-boat fishery is not expected to result in any impacts to protected species not already considered.

4.4.4 EFH, Biodiversity, and Ecosystems

As discussed in Section 4.1.4 bottomfish fishing activities have been found to not adversely affect EFH and HAPC for any MUS managed under the FMPs of the Western Pacific Region. Implementing a quota system under Alternative 4 is not expected to adversely affect EFH or HAPC. The precise effects of a potential “race for the fish” situation under Alternative 4a are unknown but are not be expected result in significant impacts as hook-and-line bottomfish fishing is considered to have low collateral impacts on bycatch and habitat. Implementing catch limits via a TAC or IFQs would impact the number of bottomfish removed, which could either result in fewer fish caught, or if high-grading occurs, in more fish caught. The former would have positive impacts on overall abundance with corresponding impacts on the ecosystem, while the latter would have negative impacts. The impacts of any increased pelagic effort by displaced bottomfish fishermen are expected to be negligible due to the use of hook-and-line gears in the small-boat pelagic fishery.

Under Alternative 4 local biodiversity and ecosystems may experience some positive effects due to reductions in bottomfish harvests.

4.4.5 Fishery Sectors

Alternative 4a

The use of a commercial fleet-wide TAC under Alternative 4a would be anticipated to result in a bunching of fishing effort at the beginning of each fishing year (October 1) as fishery participants would be aware that once the TAC was reached the fishery would be closed to all sectors. Given that the majority of commercial landings are already made during the winter season this is not likely to radically change these operations, however it may lead to market “floods” which temporarily reduce fresh fish prices and adversely impact commercial fishermen. Once the TAC was reached, this alternative may lead to an increased reliance on NWHI or imported bottomfish. However, the continued NWHI bottomfish fishery is likely to be subject to reduced catch limits pending the designation of the NWHI National Marine Sanctuary. Therefore, an increased reliance on imported bottomfish would be anticipated to have negative impacts on the entire commercial fishery sector as market channels for fresh MHI bottomfish would be lost and have to be regained each year.

Fishery sectors (both commercial and recreational) and participants may be differentially impacted depending on their ability and willingness to “race to the fish” and some may upgrade their vessels (e.g. buy large vessels or more powerful engines for existing vessels) or fish during

adverse weather in order to achieve high catches before the TAC is reached. These responses would be anticipated to result in over-capitalization (i.e. otherwise unnecessary investments to upgrade vessels) of the fishery and threats to the safety of fishery participants.

Alternative 4b

The impacts of Alternative 4b on the commercial fishery sector would vary depending on how the IFQs were implemented. If equal quotas (totaling 85 percent of the fleet-wide 2003 catch) were provided to each participant, highliners would get the same quota as part-time fishermen, and vice versa. This would leave some without enough quota, while others would have unused quota. Without a method to transfer (trade) quota between fishermen, this would have disproportionately adverse impacts on the highliners. If equal quotas were provided to a subset of all historical participants, such as those most active in recent years, those included would each have a higher quota, while those excluded would have none. The recreational (including subsistence) fishery sector would not be impacted under this alternative.

If individual quotas (equal to 85 percent of each fisherman's individual historical catch) were provided, all commercial participants would be anticipated to experience proportionately equally adverse impacts, and it is likely that more of the total quota would be used even if there were no method to transfer quota between fishermen. If individual quotas were provided to a subset of all historical participants, such as those most active in recent years, the individual quotas would not change, but some historical participants would not have any quota. The recreational (including subsistence) fishery sector would not be impacted under this alternative.

Because this alternative would also lead to an increased reliance on imported bottomfish as the commercial IFQs were reached, it would be anticipated to have negative impacts on the entire commercial fishery sector as market channels for fresh MHI bottomfish would be lost and have to be regained each year.

Vessel registration and reporting requirements under both variations of Alternative 4 would represent an ongoing burden on all sectors. In the long term the increase in information available to fishery scientists and managers should result in increased fish abundance and improved fishing opportunities.

4.4.6 Fishing Communities

Alternative 4a

Because Alternative 4a would be applied fleet-wide throughout the MHI, it is likely that much of it would be harvested by Oahu-based fishermen, because that fishing community has the highest number of participants. Fishing communities from other islands could be affected if it was perceived that Oahu fishermen, for example, were harvesting most of the fish. This sentiment could lead participants from non-Oahu fishing communities to go fishing in bad weather to ensure that they get their fair share. This can result in the loss of vessels and human life and reduce the direct and indirect positive impacts fisheries communities receive from the fishery. A

race to the fish situation could also flood local fish markets with bottomfish, thereby, positively impacting consumers, but negatively impacting fishermen because of low prices.

Alternative 4b

The impacts of Alternative 4b on Hawaii's fishing communities would vary depending on how the IFQs were implemented. Providing equal IFQs to all participants could impact fishing communities if the result is to remove highliners from them. Although there are likely to be relatively small numbers of highliners within any one fishing community, their loss would likely result in reduced availability of bottomfish to local markets, family members and social circles. It would also represent a significant loss of fishing knowledge from the active fishery.

Highliners would be less likely to leave the fishery if their respective IFQs were based on their individual historical catch. Therefore, the anticipated impacts on fishing communities would not be expected to be negatively significant, as fishing opportunities for commercial MHI bottomfish participants within all of Hawaii's fishing communities would be maintained at 85 percent of their current levels. Also maintained would be the direct and indirect economic and cultural benefits (Sections 3.6.2.3 to 3.6.2.5) for fishermen and their families, seafood consumers and their broader island communities.

Vessel registration and reporting requirements under both variations of Alternative 5 are not expected to have negative impacts on fishing communities despite the time commitments required. In the long term, positive impacts to fishing communities may occur from more accurate information on how many boats are bottomfish fishing, the amount of bottomfish they catch, and enhanced enforcement capabilities. Improved management of Hawaii's bottomfish would ensure that future opportunities to fish sustainable bottomfish stocks are provided for Hawaii's fishing communities.

4.4.7 Native Hawaiian Community

Alternative 4a

The implementation of a fleet-wide bottomfish TAC could result in a fishery closure before some Native Hawaiian fishermen caught the comparable amount of bottomfish as in previous years. This could adversely impact Native Hawaiian fishermen who depend on catching bottomfish to supplement their income or to perpetuate their culture and share with their community. Broader level cultural impacts would be anticipated once the TAC is met and both commercial and recreational bottomfish fishing is prohibited until October 1. For Native Hawaiians, who once exercised sovereignty and self-determination in the Hawaiian Archipelago, and whose activities were governed by customary and traditional practices, any curtailment or reduction of access rights and cultural practices reduces their ability to practice and continue their culture. The loss of any customary access and practice has resulted could be viewed as a permanent loss of culture for Native Hawaiian communities. On the other hand, the objective of the TAC is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiians.

Alternative 4b

The implementation of IFQs would result in negative impacts to any Native Hawaiians who do not have documented records of their historical participation in the fishery. Native Hawaiian fishermen would be adversely impacted if they are given IFQs that are below their historical catches.

For Native Hawaiians, who once exercised sovereignty and self-determination in the Hawaiian Archipelago, and whose activities were governed by customary and traditional practices, any curtailment or reduction of access rights and cultural practices reduces their ability to practice and continue their culture. The loss of any customary access and practice has resulted could be viewed as a permanent loss of culture for Native Hawaiian communities. On the other hand, the objective of the IFQs is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiian communities.

4.4.8 Administration and Enforcement

Administration and enforcement of Alternative 4 would require the expansion of the current reporting requirements to include requirements for recreational participants. All MHI vessel owners who target bottomfish are already required to register their vessels, however under this alternative they would be required to renew their registration annually. The vessel registration system would need to be expanded accordingly. This will provide current information on the maximum number of fishery participants and ease enforcement by removing the “BF” markings from vessels no longer actively participating in the fishery

Both variations of Alternative 4 would require that appropriate TACs or IFQs be determined, analyzed and published in a timely manner prior to each start of the fishing season (although it is known that current fishing mortality needs to be reduced by 15 percent, this number is likely to change over time as fishery harvests are reduced and stocks increase). As described in Section 4.4.1, the ongoing determination of these quotas would be difficult as to date not even one comprehensive stock assessment has been completed for this fishery. Problem areas include the lack of fishery independent data, difficulty in adjusting available CPUE data as highliners leave the fishery and incorporating the existence of area closures into stock assessment calculations.

The bottomfish stamp system under Alternative 4b would be administratively burdensome, both to implement and to monitor compliance as it would likely involve thousands of stamps.

Enforcement of this alternative would include increased and real time shore-based monitoring of commercial landings and sales to determine when the TAC was reached under Alternative 4a, or when each commercial participant’s IFQ was reached under Alternative 4b. Shore-based federal/state enforcement will also be required to monitor compliance of the bottomfish stamp system under Alternative 4b as dealers cannot be held wholly responsible for monitoring bottomfish stamps. Because bottomfish from the NWHI and imported bottomfish would still be available, a system to certify these fish as non-MHI fish would need to be implemented. Additional at-sea enforcement would not be required but occasional monitoring would supplement shore-side monitoring when the TAC or IFQs were reached. All vessel owners

would be required to mark their vessels with the registration number to be visible from aircraft to facilitate enforcement and vessel monitoring. Joint efforts between the State of Hawaii and federal law enforcement capacities would greatly enhance enforcement of this alternative.

4.5 Alternative 5: Combination Measures

Alternative 5 would mitigate the potentially negative impacts of the above stand-alone alternatives above by combining modifications of them. Alternative 5 includes two variations: Alternative 5a would combine a seasonal bottomfish closure with bottomfish IFQs for a limited number of MHI commercial fishing vessels during the seasonal closure, while Alternative 5b would combine a seasonal MHI closure with a year-round closure of the southern portion of Penguin Bank.

Under both versions of Alternative 5, all vessel operators (both commercial and recreational) targeting bottomfish in the MHI would be required to register their vessels on an annual basis and would be required to obtain permits as well as to complete and submit catch reports including their catches, fishing effort, and area fished.

To achieve the needs and objectives of this action (i.e. a 15 percent in MHI fishing mortality), the State of Hawaii would need to establish parallel requirements as fishing limits and closures would be required in both state and federal waters. The effectiveness of the combined measures in reducing bottomfish fishing mortality would be monitored through recreational and commercial reporting as well as enforcement activities.

The effectiveness of Alternative 5b's closed area in increasing the stock biomass of the Deep 7 species would be monitored and analyzed through a combination of fishery dependent (i.e. catch reports) and fishery independent data. Fishery independent data would be collected via controlled sampling experiments, submersible surveys, remote cameras (e.g. "Bot-Cam") and other methodologies.

Alternative 5a: Seasonal Closure and IFQs

Under Alternative 5a, the MHI bottomfish fishery would be closed during an expanded seasonal closure from May 1 to September 30 of each year, except for a small number of full-time commercial bottomfish fishermen. The exempt fishermen would each receive IFQs for the Deep 7 species that they could use during the otherwise closed season (May–September). Once each exempted fisherman's quota was landed, he would be required to stop fishing until the next open season. The combined total of all IFQs would equal 23,946 pounds of the Deep 7 species (all species combined) as this is the amount that could be made available for harvest during the otherwise closed season and still maintain the overall annual reduction of 15 percent from the 2003 baseline for the entire MHI (Table 47).

Table 47: Estimated Reductions and Available Pounds under Alternative 5a.

Target Reduction	MHI Closure Months	Estimated Reduction in MHI Landings due to May-September closure	Pounds Available to Harvest and Still Meet 15 Percent Target Reduction
15 percent 35,027 pounds	May–September	25.25 percent 58,973 pounds	23,946 pounds

Each MHI commercial bottomfish fisherman exempted from the summer closure would be issued a set of bottomfish stamps, with each stamp representing a certain number of pounds of bottomfish and all the stamps totaling the vessel's IFQ for the otherwise closed season. The fisherman would be required to submit a stamp to the dealer at the point of sale. If the fisherman sold fish in excess of the number of bottomfish pounds for one stamp, he would be required to surrender a second stamp to the dealer. Once all the stamps were submitted the fisherman would be prohibited from targeting, possessing, landing or selling MHI Deep 7 bottomfish until the next open season.

As in Alternative 4, IFQs could be calculated and provided in equal amounts to all qualifying fishermen, or they could be calculated and provided such that each qualifying fisherman's quota was proportionate to his historical catch. However, in either case, the sum of the IFQs would not exceed the 23,946 pounds available.

Alternative 5b: Seasonal Closure and Area Closure

Alternative 5b would combine a seasonal closure from June 1 to August 31 of each year for the MHI with a year-round partial closure of Penguin Bank. All MHI bottomfish fishermen would be prohibited from targeting, possessing landing or selling the Deep 7 species from the MHI during the summer closure. However, the year-round partial closure of Penguin Bank would enable the length of the summer closure to be reduced as compared to other alternatives. Based on historical MHI landings of deep-slope bottomfish, a summer closure from June through August would reduce landings by up to 11 percent as compared to the 2003 baseline (Kawamoto et al. 2005). Based on 1998 to 2004 historical data indicating that federal waters around Penguin Bank are the source of 16 percent of MHI Deep 7 catches as compared to the 2003 baseline (Kawamoto et al. 2005) and lacking spatially detailed catch and effort data for this area, the closure of the southwestern quarter of Penguin Bank would be estimated to further reduce landings by an additional 4 percent. Thus the combination of the seasonal and area closures under Alternative 5b would be expected to achieve the 15 percent reduction target.

4.5.1 Target Species

Alternative 5a

Under Alternative 5a, deepwater bottomfish throughout the MHI would be protected during the closed season with the exception of the limited commercial harvest by exempted fishermen. Those fishermen who do not receive a summer quota could shift their effort to open periods, thus potentially reducing the benefits of the closures. However, shifting is expected to be low because the closure would occur during the time when bottomfish activity has been historically low as

fishermen switch to other fisheries (Figure 34). Both the pelagic troll (e.g. yellowfin) and the hook-and-line mackerel (akule and opelu) fisheries are at their peak during the summer period. In addition, some bottomfish participants would receive IFQs and could thus continue fishing during the otherwise closed season. Those who did not may be reluctant to increase their bottomfish fishing activity during the winter months when waters are generally rougher.

Although bottomfish spawn year round, there is evidence that spawning is greatest during the summer months (Haight et al. 1993). An annual June through August closure could provide additional benefits by prohibiting fishing during the peak spawning period and thus reducing fishing mortality of spawning bottomfish.

Reporting requirements for recreational fishermen under Alternative 5a would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having complete information would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

Alternative 5b

Under Alternative 5b deepwater bottomfish throughout the MHI would be protected during the closed season. Fishing effort could shift to open periods, potentially reducing the benefits of the closures. The extent of effort shifting to open periods is unknown. However, given that the closure period is timed when bottomfish activity has been historically low, participation by fishermen who in other fisheries is high (i.e. yellowfin troll fishery and hook-and-line akule and opelu), and the fisheries dependence on suitable weather, significant shifting of effort to open areas is not likely to occur. The annual June through August closure could provide additional benefits by limiting fishing during the peak spawning periods of some bottomfish species.

Alternative 5b would further protect targeted species within the year-round closed area on the southern portion of Penguin Bank. In this scenario, fishing effort could be displaced to open areas, thus reducing the benefits of the closures. The likely extent of such moves is unknown but given that 30 percent of the commercial MHI landings are made by Oahu-based boats (with Penguin Bank representing a significant proportion of these landings), and that the market demand will continue for fresh MHI bottomfish, some shifting of effort is likely to occur.

The partial closure of Penguin Bank would provide a refuge for the targeted species to the extent that they remain in the closed area. Adult bottomfish are thought to have a relatively limited range, but there is substantial variation in the extent of movement by different species during various life stages. For example, opakapaka are believed to move greater distances than onaga and unlike juvenile opakapaka, which have been found to occupy shallower depths than adults, juvenile onaga and ehu were found in the same depths and habitat as were adults. In addition, tagging studies conducted by HDAR from 1989 to 1994 found that adult opakapaka move extensively within their habitat range and cross deep inter-island channels and move between banks.

As discussed in Section 4.2.1, the shortcomings associated with reporting bottomfish based on the commercial fisheries statistical grids are particularly problematic regarding Penguin Bank. Without improved spatial reporting, precise estimates of reductions in fishing mortality due to the implementation of the area closure would be difficult to achieve.

Reporting requirements for recreational fishermen under Alternative 5b would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having complete information (whether spatially detailed or not) would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

4.5.2 Nontarget Species and Bycatch

Alternative 5a

Under Alternative 5a, nontarget species throughout the MHI would be protected during the closed season with the exception of catches associated with the limited commercial harvest by exempted fishermen. Those fishermen who do not receive a summer quota could shift their effort to open periods, thus potentially reducing the benefits of the closures to nontarget species. However, shifting is expected to be low because the closure would occur during the time when bottomfish activity has been historically low as fishermen switch to other fisheries (Figure 33).

If the reduction in catches of target species results in a reduced market supply of fresh local bottomfish, currently low priced species may attain a higher value, with an associated greater incentive to land and sell fish that are currently discarded (e.g. ulua), thereby leading to possible shifting of commercial targets and concurrent reductions in bycatch. In addition, if fishing effort shifts to new or less productive time periods, nontarget catches and bycatch could increase as fishermen explore and discover new fishing grounds or techniques (i.e. shallow-water bottomfish fishing or trap fishing).

As noted in Section 4.2.1, recreational fishermen, in general, are expected to have less targeting skill than commercial fishermen, and therefore may have higher nontarget catches. They should, however, be less influenced by market value and therefore may be expected to retain more nontarget species than commercial fishermen.

Reporting requirements (including information on nontarget catches and bycatch) for recreational fishermen under Alternative 5a would improve the scientific understanding of influences on nontarget stocks and would be expected to improve fishery management.

Alternative 5b

Under Alternative 5b nontarget species throughout the MHI would be protected during the closed season. As discussed above, fishing effort could shift to open periods, potentially reducing the benefits of the closures.

Alternative 5b would further protect nontarget species within the year-round closed area on the southern portion of Penguin Bank. As discussed above, in this scenario fishing effort could be displaced to open areas, thus reducing the benefits of the closures.

As discussed in Section 4.2.1, the shortcomings associated with reporting bottomfish based on the commercial fisheries statistical grids are particularly problematic regarding Penguin Bank. Without improved spatial reporting, precise estimates of reductions in fishing mortality due to the implementation of the area closure would be difficult to achieve.

Reporting requirements (including information on nontarget catches and bycatch) for recreational fishermen under Alternative 5b would provide information on the catch and effort by this group. Such information is not currently collected and thus fishery scientists and managers do not know the total fishery removals taking place. Having complete information (whether spatially detailed or not) would improve the scientific understanding of influences on Hawaii's bottomfish stocks and would be expected to improve fishery management.

4.5.3 Protected Species

Alternative 5 has two variations, each is a combination of other alternatives already discussed. Alternatives 5a and 5b are not expected to result in any significant impacts to listed species or any other protected species. In the 2002 Biological Opinion, NMFS concluded that the bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat. NMFS also found that the bottomfish fishery does not adversely affect any listed whales or sea turtles. Offshore bottomfish fisheries in the MHI are not known to interact with endangered or other protected species. The 2002 Biological Opinion mentions that several monk seals that have been found with embedded hooks mostly of the type used by the shoreline ulua fishery, however, monk seals have also been found with hooks similar to the type used in the bottomfish fishery (NMFS 2002).

4.5.4 EFH, Biodiversity, and Ecosystems

As discussed in Section 4.1.4 bottomfish fishing activities have been found to not adversely affect EFH and HAPC for any MUS managed under the FMPs of the Western Pacific Region. Implementing either variation of Alternative 5 is not expected to adversely affect EFH or HAPC due to the low impacts of this fishery. The potential for increased bottomfish fishing effort in the open season is not expected to significantly affect EFH or HAPC because hook-and-line bottomfish fishing is considered to have low collateral impacts on bycatch and habitat. Similarly, the impacts of any increased pelagic effort during the closed season are expected to be negligible due to the use of hook-and-line gears in this fishery.

Under Alternative 5 local biodiversity and ecosystems may experience some short term positive effects because cessation of bottomfish fishing activity for the 5-month period would allow for fish growth, undisturbed spawning, and other benefits of non-capture.

4.5.5 Fishery Sectors

Alternative 5a

The expanded (May–September) summer closure would impact all fishery sectors; however, this is believed to normally be a period of lower bottomfish fishing activity because of the increased availability of pelagic fish, so this impact may be relatively low. The provision of equal IFQs for use by a subset of commercial fishermen during the otherwise closed season will offset the impacts on this group. However, as discussed under Alternative 4, the allocation of equal quotas to each qualifying participant would likely leave some without enough quota, while others could have unused quota. Without a method to transfer (trade) quota between fishermen, this would have adverse impacts on the qualifying highliners. Because the sum of the IFQs cannot exceed the 23,946 pounds available, the size of each fisherman’s quota would be inversely related to the total number of fishermen who received IFQs (the more who are included, the smaller each one’s share must be). Quotas that are too small to support even one fishing trip are clearly likely to go unused. Impacts on those commercial, sport, and recreational (including subsistence) fishermen who do not qualify for an IFQ would be adverse. As compared with alternatives that would result in time periods during which no MHI bottomfish were landed (resulting from seasonal closures or TACs or universal IFQs), this alternative would be expected to have a strongly positive impact on the entire commercial fishery sector. It would provide a continuous supply of fresh MHI bottomfish to local markets, thus maintaining open market channels that would otherwise be expected to be filled by increased imports during the closed season. Experience has shown that if imports come to dominate market channels, it can be difficult for local producers to regain their market share as wholesalers and retailers can be reluctant to forgo their now-established supply chains.

Table 47 presents a preliminary analysis of the number of fishery participants anticipated to qualify for IFQs under various minimum landing requirements. These requirements range from minimum landings of at least one pound up to 5,001 pounds of BMUS from the MHI made between May and September of any one year between 1998 and 2004 (inclusive). Based on the information available in Table 48, all minimum landing thresholds would result in qualifying participants receiving IFQs below their historical landings and would thus be expected to result in full utilization of the available quota. Information on the mean historical landings by participants who caught more than 5,001 pounds is unavailable due to confidentiality requirements which prohibit the publication of data submitted by less than three individuals or operations.

Table 48: Anticipated Participation and IFQ Levels under Various Minimum Landing Requirements.

Minimum landing requirement to qualify for May-Sept IFQ	Anticipated number of qualifying participants (based on reported May-Sept MHI landings, 1998-2004)	Anticipated May –Sept. IFQ per qualifying participant (lbs)	Historical May-Sept. mean landings by qualifying participants (lbs)
1-500 lbs	970	25	89
501-1000 lbs	91	263	691
1001-2000 lbs	43	557	1,385
2001-5000 lbs	12	1,995	3,085
More than 5001 lbs	2	11,973	confidential

Source: PIFSC unpublished data.

Alternative 5b

The impacts of Alternative 5b would be generally evenly spread across fishery sectors as it does not differentiate between commercial, sport, and recreational (including subsistence) fishermen. As compared with Alternative 5a, the impacts of the summer closure would be reduced due to its shortened duration. However, the year-round closure of the southern portion of Penguin Bank would disproportionately affect fishing operations based on Oahu and Kauai. Because this alternative would lead to an increased reliance on imported bottomfish during the closed season, it would be anticipated to have negative impacts on the entire commercial fishery sector as market channels for fresh MHI bottomfish would be lost and have to be regained each year.

Vessel registration and reporting requirements under both variations of Alternative 5 would represent an ongoing burden on all sectors. In the long term the increase in information available to fishery scientists and managers should result in increased fish abundance and improved fishing opportunities.

4.5.6 Fishing Communities

The seasonal closure under Alternative 5a is not expected to significantly negatively impact fishing communities in Hawaii, but would impact some fishermen in all communities. As seen in Figure 33, summer months between May and August represent the lowest amounts of monthly bottomfish landings, with the winter months of December through February having the highest landings. Also, under Alternative 5a, a small number of full-time commercial bottomfish fishermen would be exempt from the seasonal closure, and these exempt fishermen would each receive IFQs. As described in Alternative 4b, these IFQs could be calculated and provided in equal amounts to all qualifying fishermen, or they could be calculated and provided such that each qualifying fisherman's quota was proportionate to his historical catch. Because the IFQs would likely be provided to qualifying full-time commercial bottomfish fishermen, less negative impacts to fishing communities are expected if there is equal representation of exempted fishermen among fishing communities. However, more negative impacts could be expected if

there is not equal representation. For example, if 70 percent of the exempted IFQ fishermen are Oahu-based and 30 percent are from Maui, the fishing communities of Niihau, Kauai, Molokai, Lanai, and Hawaii would not receive the social benefits of having fishery participants catching fish during the seasonal closure as would Oahu and Maui. In this scenario resentment could occur between fishing communities.

Similarly, the seasonal closure under Alternative 5b (June 1 to August 31) is not expected to significantly negatively impact fishing communities in Hawaii, but would impact some fishermen in all communities. Alternative 5b combines the seasonal closure with a year-around closure of the southern portion of Penguin Bank. As discussed in Section 4.2.7, Penguin Bank is primarily used by Oahu bottomfish fishermen. A reduction in available fishing areas to Oahu fishermen could lead them to fish in areas closer to Oahu or in areas they previously did not, such as closer to Molokai. A year-around partial closure of Penguin Banks could also impact Oahu's and Molokai's fishing communities if the closure results in significant competition for available open areas.

Both scenarios under Alternative 5 would require all vessel operators (commercial and recreational) targeting bottomfish to (a) register their vessels on annual basis, (b) obtain permits (c) complete and submit catch reports, and (d) mark their vessels on an unobstructed upper surface are not expected to negatively impact fishing communities. Although these provisions would require fishery participants to take time out of their schedule to register their vessel, fill out their permit application and catch reports, and mark their vessels, the level of impact on individual fishermen is not expected to be significant. In the long term, positive impacts to fishing communities may result because of fishery managers obtainment of accurate information on how many boats are bottomfish fishing and the amount of bottomfish being caught (from all sectors), as from mechanisms to enhance enforcement. This in turn is believed to improve management of Hawaii's bottomfish stocks so that future opportunities to fish sustainable bottomfish stocks are provided for Hawaii's fishing communities.

Vessel registration and reporting requirements under both variations of Alternative 5 are not expected to have negative impacts on fishing communities despite the time commitments required. In the long term, positive impacts to fishing communities may occur from more accurate information on how many boats are bottomfish fishing, the amount of bottomfish they catch, and enhanced enforcement capabilities. Improved management of Hawaii's bottomfish would ensure that future opportunities to fish sustainable bottomfish stocks are provided for Hawaii's fishing communities.

4.5.7 Native Hawaiian Community

Alternative 5a

The impact of Alternative 5a on Native Hawaiians is anticipated to be similar to that which would be expected under Alternatives 3 and 4b. That is, negative economic and cultural impacts would result if Native Hawaiian commercial fishermen do not meet the criteria and are not awarded IFQs to fish during the seasonal closure. The seasonal closure may also impact Native Hawaiian bottomfish fishermen who historically have caught bottomfish during the summer months. Reduced access rights and cultural practices impact the ability of Native Hawaiians to practice and continue their culture. The loss of any customary access and practice could be viewed as a loss of culture for Native Hawaiians.

On the other hand, the objective of the measures is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiians.

Alternative 5b

The seasonal closure would impact Native Hawaiian bottomfish fishermen who historically have caught bottomfish during the summer months. The year-around closure of the southern portion of Penguin Bank may disproportionately affect Native Hawaiian fishermen from Oahu due to its close proximity.

Reduced access rights and cultural practices may potentially impact the ability of Native Hawaiians to practice and continue their culture. The loss of any customary access and practice could be viewed as a loss of culture for Native Hawaiians.

On the other hand, the objective of the measures is to reduce fishing mortality, thereby ensuring a sustainable resource. A sustainable and accessible bottomfish resource would provide positive impacts to Native Hawaiians.

4.5.8 Administration and Enforcement

Administration and enforcement of Alternative 5 would require the expansion of the current reporting requirements to include requirements for recreational participants. All MHI vessel owners who target bottomfish are already required to register their vessels, however under this alternative they would be required to renew their registration annually. The vessel registration system would need to be expanded accordingly. This will provide current information on the maximum number of fishery participants and ease enforcement by removing the “BF” markings from vessels no longer actively participating in the fishery

Alternative 5a would require that appropriate IFQs be determined, analyzed and published in a timely manner prior to each start of the fishing season (although it is known that current fishing mortality needs to be reduced by 15 percent, this number is likely to change over time as fishery

harvests are reduced and stocks increase). As described in Section 4.4.1, the ongoing determination of these quotas would be difficult as to date not even one comprehensive stock assessment has been completed for this fishery. Problem areas include the lack of fishery independent data, difficulty in adjusting available CPUE data as highliners leave the fishery and incorporating the existence of area closures into stock assessment calculations.

Enforcement of this Alternative 5a would include increased and real time shore-based monitoring of commercial landings and sales to determine when each commercial participant's IFQ was reached. Commercial fishermen in the MHI who are exempt from the summer closure would be issued stamps representing a certain number of pounds to track their IFQ that would place some administrative burden on the fishermen and the dealers to track and account for landings with regards to not exceeding the IFQ. Because bottomfish from the NWHI, and imported bottomfish would still be available, a system to certify these fish as non-MHI fish would need to be implemented.

Enforcing the seasonal closures under both variations of Alternative 5 would require that a parallel closure occur in State waters because shore-based determinations of the origin (i.e. from State vs. federal waters) of MHI bottomfish landed or sold would be impossible. Without parallel rules, enforcement of the seasonal closures would require extensive at-sea monitoring of federal waters during the closure period. Joint efforts between the State of Hawaii and federal law enforcement capacities would greatly enhance enforcement of this alternative.

4.6 Impacts to the Regional Economy

The economic effects of implementing conservation measures for MHI bottomfish fisheries depend largely on how fishermen and the seafood market react to those measures. For the fishermen, we expect they will adjust to the extent possible by shifting their effort to other time-area strata. For the market, the same applies in terms of finding substitutes for decreases in their supply of MHI bottomfish. Their primary alternatives are as follows: NWHI bottomfish, imported bottomfish, other species (non-bottomfish).

For the fishermen, the management objective is to reduce bottomfish catch in the main Hawaiian Islands by 15 percent, roughly 35,000 pounds of the deep snapper/grouper complex¹ or \$110,000 ex-vessel. The aggregate impact on Hawaii's economy would be small. Using an input/output approach,² as a rough order of magnitude, the total economic impact would be \$300,000 in business sales with a loss of \$120,000 in income.

However, fishermen would have the ability to offset some of this cost by substituting different target species and to adjust their fishing patterns accordingly. Obviously the distribution of this cost across currently active (or potentially newly active) participants would differ by their current levels of fishing effort, but if there are roughly 300 active commercial bottomfish

¹ This analysis focuses on the seven species subject to special management consideration by the State of Hawaii. Other important bottomfish species are not included in this analysis (e.g. uku and ulua) and hence the totals here are lower than those based on the entire BMUS complex.

² Modifying Leung and Pooley (2002) analysis of the pelagic longline fishery.

fishermen in the MHI, the average impact is minimal (\$354 per fishermen).³ The same would be true, without the dollar figure, for recreational fishermen. The extent of that substitution cannot be estimated in advance, but the above figures would indicate the maximum cost for the fleet and per vessel.

Much of the importance of the Hawaii bottomfish fishery is that it provides a relatively unique product with the potential for a high added value in the processing chain through its appearance on the menus of white tablecloth restaurants. NWHI bottomfish would presumably be the primary source of substitution for MHI bottomfish.

Imports have averaged 750,000 pounds in recent years (2003 to 2004), with the primary sources of imported snapper being Australia and Tonga.¹³ Increasing imports for the year by 35,000 pounds would represent a 5 percent increase in imports and is within the variability of that time series. The peak season for imports is May to August, which corresponds to the proposed seasonal alternative. There is also a strong negative correlation between imports and MHI landings, suggesting that when MHI landings decline, imports increase. Increasing imports for these 4 months would amount to a 12 percent increase in imports over that time period.

There is a consumer price element in which any decrease in the supply of bottomfish would be expected to increase prices by a certain percentage. Pooley (1987) computed the price flexibility coefficient to be 42 percent, meaning that a 15 percent decrease in supply would increase price by 6 percent or roughly 18 cents with an attendant decrease in consumer satisfaction.

In addition, the Hawaii bottomfish fishery is also important culturally, a value not entirely reflected by the seafood market. Again, NWHI bottomfish would be considered in many cases a close substitute, but substituting different snapper species from imports would not be a close cultural substitute. More research would be required on the implications of this effect on Hawaii's communities, but the proposed seasonal closure alternatives do miss the primary cultural celebration (i.e. New Years). Figure 34 shows the average monthly landings of Hawaii Bottom fish. Figure 35 shows the average monthly snapper imports into Hawaii.

³ This figure can be compared WITH average ex-vessel returns for small boat fishermen in Hawaii of \$42,000 (Hamilton 1997).

¹³ NMFS foreign trade statistics: <http://www.st.nmfs.gov/st1/trade/index.html>

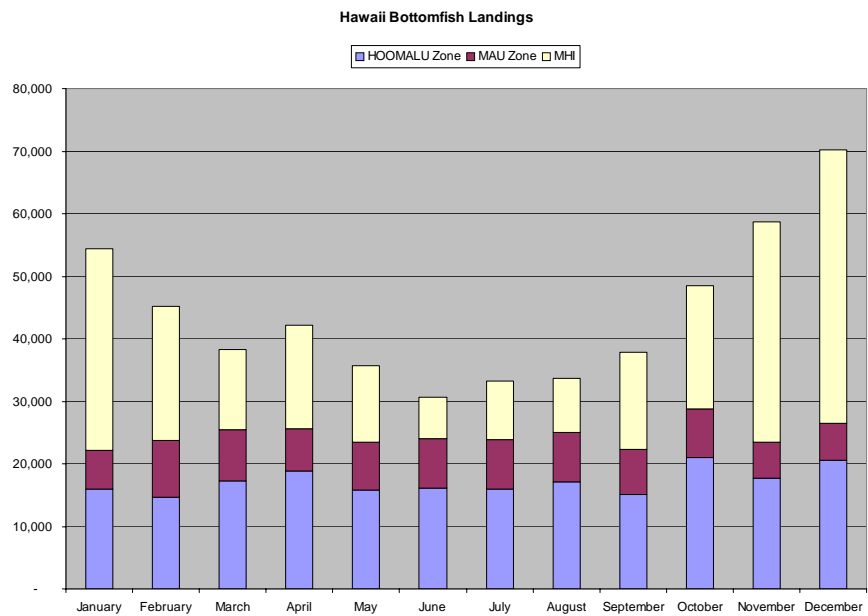


Figure 34: Average Monthly Landings of Hawaii Bottomfish. Source: WPRFMC 2005c, 2003 Bottomfish Annual Report.

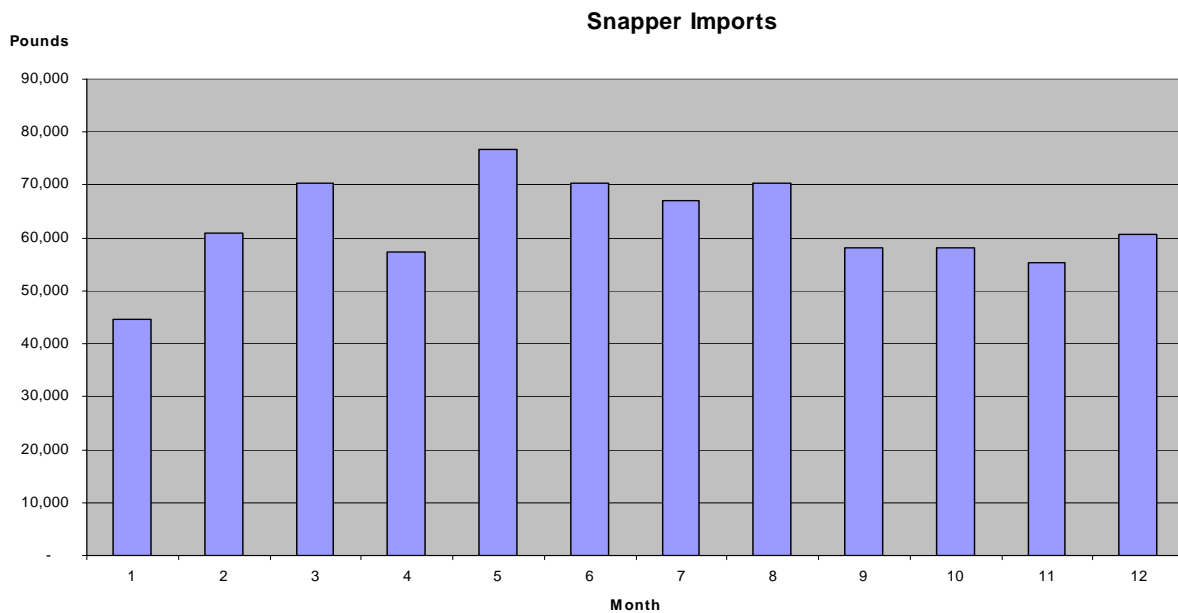


Figure 35: Average Monthly Snapper Imports to Hawaii. Source: PIFSC Unpublished Data.

4.7 Environmental Justice

On February 11, 1994, President William Clinton issued Executive Order 12898 (E.O. 12898) titled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” E.O. 12898 provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” E.O. 12898 also provides for agencies to collect, maintain, and analyze information on patterns of subsistence consumption of fish, vegetation, or wildlife that agency action may also affect subsistence patterns of consumption and indicate the potential for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, and Indian tribes. A memorandum by President Clinton that accompanied E.O. 12898 made it clear that environmental justice should be considered when conducting NEPA analyses by stating the following: “Each Federal agency should analyze the environmental effects, including human health, economic, and social effects of federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA.”¹⁴

Impacts of the proposed bottomfish management actions on Native Hawaiians were identified through the scoping process as an issue that may have environmental justice considerations. The impacts to Native Hawaiians of each of the alternatives are discussed in Sections 4.1.7, 4.2.7, 4.3.7, 4.4.7, and 4.5.7, and 4.8.10.

¹⁴ Memorandum from the President to the Heads of Departments and Agencies. Comprehensive Presidential Documents No. 279 (Feb. 11, 1994).

Table 49: Summary Impact Comparisons of the Alternatives.

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Target Species	<p>(-) Continued overfishing.</p> <p>(-) Does not meet MSA requirements.</p> <p>(?) The impact of a revised State of Hawaii bottomfish management regime.</p> <p>(-) Recreational fishermen would continue not to be required to submit catch reports, and the recreational catch component would continue to be unknown.</p>	<p>2a: (+) Anticipated to reduce landings by up to 20 percent based on historical catch.</p> <p>2b: (+) Anticipated to reduce landings by up to 15 percent based on 2004 catch.</p> <p>(+) Closed areas may be able to replenish stocks in adjacent habitat (i.e. spillover).</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p> <p>(-) Fishing effort may increase in open areas reducing benefits of closures & depressed CPUE in those areas fished.</p>	<p>(+) Anticipated to reduce landings by up to 17 percent based on historical catch.</p> <p>(+) May protect bottomfish summer spawning aggregations & reduce mortality on spawning fish increasing biomass over time.</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p> <p>(-) Fishing effort may increase during open periods reducing overall benefit.</p>	<p>(+) Anticipated reduce landings up to 15 percent based on historical catch.</p> <p>(+) Sets hard limits on amount of fish caught.</p> <p>(+) Recreational and commercial catch data collection would be improved with new, timely reporting requirements.</p> <p>(-) Lack of robust stock assessments may lead to errors in setting harvest limits.</p> <p>(-) Poor, missing data on catch especially in recreational fishery may lead to errors in setting harvest limits.</p> <p>(-) May lead to high-grading and thus no net decrease in mortality.</p>	<p>(+) Anticipated to reduce landings up to 15 percent based on historical catch.</p> <p>(+) Both options would reduce fishing mortality.</p> <p>(+) Recreational catch data would be improved.</p> <p>(+) Both options would reduce bottomfish landings during closed season.</p> <p>5a: (+) May protect bottomfish spawning aggregations & reduce mortality on spawning fish, increasing biomass over time.</p> <p>5a: (-) Lack of robust stock assessments may lead to errors in setting harvest limits.</p> <p>5b: (+) Closed areas may replenish stocks in adjacent habitat (i.e. spillover).</p> <p>5b: (-) Fishing effort may increase in open areas reducing benefits of closures.</p>

Legend: (+) positive, (-) negative, (?) unknown, (n) neutral

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Nontarget Species and Bycatch	<p>(n/+) If the decline in fishing effort continues, there may be a decline in catch of nontarget spp.</p> <p>(n) Bycatch data in the MHI has only recently been reported, but is estimated to be minimal, and disproportionately limited to a few number of species which likely survive when discarded.</p>	<p>(+) Catch of nontarget spp. would be eliminated in closed areas.</p> <p>(n/-) Increased effort in open areas may locally increase catch of nontarget species and bycatch in those areas.</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p>	<p>(n/-) Increased effort during open period may lead to increased catches of non-target species and bycatch, especially for species more abundant during the open season.</p> <p>(+) The minimal bycatch levels would be eliminated during closed period.</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p>	<p>(-) If annual quota is met, effort to catch normally non-target species may increase.</p> <p>(n) Bycatch in deep handline fishery is minimal so reduction in bycatch would be minimal.</p> <p>(-) Highgrading may increase bycatch, including that of target species.</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p>	<p>(n) Bycatch is minimal so reduction in bycatch would be minimal.</p> <p>5a: (-) Highgrading may increase bycatch, including that of target species.</p> <p>(+) Recreational catch data collection would be improved with new reporting requirements.</p>
Protected Species	<p>(n) Rare interactions between bottomfish fishers and protected species. A decline in bottomfish fishing, it is expected that there will be a proportional reduction in the potential of an interaction.</p>	<p>(+) Potential minor benefits in preventing possible interactions in closed areas.</p> <p>(n) Impact of potential increased effort in open fishing areas likely negligible as interactions are rare.</p>	<p>(+) The possibility of protected species interactions would be eliminated during closed period.</p>	<p>(n/+) An enforced reduction in landings and possible shortened season may result in a proportional reduction of potential interactions.</p>	<p>(+) Possible minor benefits in preventing potential interactions.</p>

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
EFH, Biodiversity, & Ecosystem	(n) Bottomfish fishing has a negligible impact on habitat due to gear and methods used, nor significant adverse effects on biodiversity or ecosystems.	(n) Bottomfish fishing has a negligible impact on habitat due to gear and methods used, nor significant adverse effects on biodiversity or ecosystems. (n/+) Negligible or slightly positive effects by less fishing effort in closed areas. (?/-) Potential for localized negative effects if bottomfish fishing effort is too highly concentrated in open areas with suitable habitat.	(n) Bottomfish fishing has a negligible impact on habitat due to gear and methods used, nor significant adverse effects on biodiversity or ecosystems. (+) Potential negative impacts on EFH, biodiversity, and ecosystems would be eliminated during closure period. (?/n) The impacts of a potential increased level of effort during open season are unknown, but likely minimal.	(n) Bottomfish fishing has a negligible impact on habitat due to gear and methods used, nor significant adverse effects on biodiversity or ecosystems. (+/n) No likely effect on EFH or slight positive effect by less fishing presence once the TAC is reached.	(n) Bottomfish fishing has a negligible impact on habitat due to gear and methods used, nor significant adverse effects on biodiversity or ecosystems. (+/n) No likely effect on EFH or slight positive effect by less fishing presence once an IFQ is reached and due to no bottomfish fishing during closure period.

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Fishing Sectors	(-) Continued overfishing would lead to decreased landings.	<p>2a: (-) Closure of Penguin Bank, the most productive bottomfish area in the MHI, may result in failure of full-time bottomfish fishing and multi-fishery operations.</p> <p>2a: (-) Impact to all sectors will not be distributed evenly throughout the islands; greatest impact will be to Oahu and Kauai based fishermen.</p> <p>2b: (-) Proposed closures may impact small boat recreational and commercial fishermen throughout state if forced to travel farther to bottomfish because historical fishing grounds closed.</p>	<p>(+) Impacts distributed evenly throughout all fishing sectors.</p> <p>(+) Pelagic troll or other fisheries are viable alternatives for MHI bottomfish fishers during closed season.</p> <p>(n) Historically there are higher monthly bottomfish landings during the proposed open season.</p>	<p>(+) Commercial bottomfish fishers who have correctly reported their catch will lose less than those who have not reported or have underreported their catches.</p> <p>(-) Fishermen with poorly documented catch records may be squeezed out of the fishery.</p> <p>(-) May restrict new entry into the fishery.</p>	<p>5a: (+) Commercial bottomfish fishers who have correctly reported their catch will lose less than those who have not reported or have under-report.</p> <p>5a:(+) Pelagic troll or other fisheries are viable alternatives for MHI bottomfish fishers during closed season..</p> <p>5a: (-) Fishermen with poorly documented catch records may be squeezed out of the fishery.</p> <p>5a: (-) May prevent new entry into the fishery.</p> <p>5b: (+) Impacts distributed evenly throughout fishing sectors, but Oahu fishing sectors likely more affected.</p> <p>(+) Pelagic troll fishery is a viable alternative for MHI bottomfish fishers</p>

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Fishing Communities	(-) Continued overfishing may reduce the social and economic benefits of maintained fishing opportunities.	2a: (-) Disproportionate localized economic and social impacts to Oahu and Kauai fishing communities. 2b: (-) Potential negative impact on communities located near proposed area closures...	(+) Impacts distributed evenly across the state. (+) The fishery would not be closed during holiday season when red bottomfish are most desired by local communities. (-) Marginal impact if seasonal closure is implemented during historically low periods of fishing effort and landings.	4a: (+) A TAC would likely affect all fishing communities equally. 4b: (+) Distribution of IFQs recognizes past participation and experience in fishery. 4b: (-) For those fishing communities whose commercial fishermen have poorly documented catch records may be squeezed out of the fishery.	5a: (+) Distribution of IFQs recognizes past participation and experience in fishery. 5a: (-) For those fishing communities whose commercial fishermen have poorly documented catch records may be squeezed out of the fishery 5b: (+) Impacts distributed evenly across the state 5b: (-) Likely disproportionate localized economic and social impacts to the Oahu fishing community.

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Native Hawaiian Communities	(-) Continued overfishing would lead to decrease in CPUE and available bottomfish.	(-) Any government curtailment or reduction of access rights & cultural practices may be seen as a permanent loss of culture, especially for those Native Hawaiians. 2b (-): Potential negative impact on those Native Hawaiian communities located near proposed area closures.	(+) Impacts distributed evenly across state. (n/-) Marginal impact if seasonal closure is implemented during historically low periods of fishing effort. (-/n) Any government curtailment or reduction of access rights & cultural practices may be seen as a permanent loss of culture; however seasonal closures were historically used by Native Hawaiians to manage marine resources.	(-) Any government curtailment or reduction of access rights & cultural practices may be seen as a permanent loss of culture.	(-) Any government curtailment or reduction of access rights & cultural practices reduces may be seen as a permanent loss of culture.

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Administration and Enforcement	<p>(+) No impacts or additional costs.</p> <p>(n) Continue to monitor the status of the fishery.</p> <p>(-) Would continue to have limited data, especially for recreation fishing effort & landings hindering future management efforts.</p>	<p>2a: (+) Penguin Bank is a large area close to Oahu that will make it easier to enforce and monitor.</p> <p>2a: (-) Middle Bank is farther from Oahu and would likely be monitored via air surveillance (costly) than by boat by USCG.</p> <p>(-) Requires a research monitoring program to be implemented to measure effectiveness.</p> <p>(-) Enforcement of closed areas requires at-sea and air enforcement, which is costly.</p> <p>2b: (+,-) May allow the force of federal jurisdiction to enhance state jurisdiction in the MHI, but multiple relatively small closed areas with open areas in between are difficult to enforce.</p> <p>2b: (-) Historically, DOCARE has been under-funded and lacked the ability to enforce the existing BRFA's. Burdening the USCG with enforcing the proposed closed areas could negatively affect them as they have other important missions (e.g. Homeland security).</p>	<p>(n/-) Requires enhanced state and federal coordination. Similar rules would need to be established by both state and federal agencies.</p> <p>(-) Certification of imported and NWHI bottomfish will be needed.</p> <p>(-) Administrative and enforcement costs will increase over current levels.</p> <p>(+) At-sea and air enforcement, which is costly, would be minimal; can be enforced through dockside enforcement or monitoring of markets and dealers. Could use existing dealer reporting program to check sales and landings</p>	<p>4a: (-) Closely monitoring of catch reports may require more resources.</p> <p>4a: (+) Costly at-sea and air enforcement not required unless quota is met.</p> <p>4a: (-) All bottomfish sold would have to be tracked to point of sale because imported.</p> <p>4b: (-) Implementing and monitoring IFQs would likely require additional resources.</p> <p>4b: (-) Enforcement would be difficult catch fishermen who exceed their IFQ.</p>	<p>5a: (-) Closely monitoring of catch reports may require more resources.</p> <p>5a: (-) Enforcement would be difficult catch fishermen who exceed their IFQ.</p> <p>5b: (+) Penguin Bank is close to Oahu allowing it easier to enforce and monitor.</p> <p>(-) Enforcement of closed areas requires at-sea and air enforcement, which is costly.</p>

	Alternative 1: No Action	Alternative 2: Area Closures	Alternative 3: Seasonal Closure	Alternative 4: Catch Quotas	Alternative 5: Combination Measures
Regional Economy	(-/n) Continued overfishing may eventually lead to a collapse of the bottom fishery in the MHI.	<p>2a: (-/n) Closure of Penguin and Middle Banks may slightly affect the economy of Oahu and Kauai.</p> <p>2b: (-) Statewide closures may have slight effects on economy statewide.</p> <p>(-) May encourage importation of lesser quality products that will further erode the market for local bottomfish in local markets</p> <p>(-) May encourage increased importation of similar products that may facilitate the supplanting of the traditionally high-priced local bottomfish species.</p>	<p>(+) Seasonal closure would be during period of historically slow bottomfish fishing activity.</p> <p>(+) Winter months and important holiday seasons would remain open when red fish is most desired by local communities.</p> <p>(-) MHI bottomfish product would be eliminated from market during closure period.</p> <p>(-) MHI Bottomfish fishermen may lose foothold due to higher levels of imports.</p>	<p>(-) With reduced bottomfish landings there will be a loss of revenue.</p> <p>(-) If quotas are met, imports of bottomfish are likely to increase above the current level of an average 750,000 pounds.</p>	<p>5a: (+) IFQs for small proportion of commercial fishermen would provide markets with MHI bottomfish during closed season; less reliance on imports during closed season.</p> <p>5b: (n/-) Partial closure of Penguin Bank may slightly impact Oahu bottomfish fishermen's' contribution the regional economy.</p>

4.8 Cumulative Effects

This section describes the potential cumulative effects of the proposed action and the alternative actions considered. The Council on Environmental Quality's regulations for implementing NEPA defines cumulative effects as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7 and 1508.25). The intent of the cumulative effects analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. This cumulative effects analysis also describes the additive and synergistic results of the actions considered in this DSEIS as they interact with factors external to the proposed actions. This evaluation addresses the direct and indirect effects of the alternatives as well as other factors that affect the physical, biological, and socioeconomic components associated with Hawaii Archipelago.

4.8.1 History of Bottomfish Fishing in Hawaii

As discussed in Section 3.4.1, the history of bottomfish fishing in Hawaii is extensive. Native Hawaiians were bottomfish fishing long before European explorers first visited the Hawaiian Islands, but the subsequent European colonization of Hawaii led to the development of a local cash economy and commercial fishing operations. By the beginning of the twentieth century, and after successive waves of immigrants arrived in Hawaii, the bottomfish fishery was dominated by Japanese fishermen who fished in the MHI as well as in NWHI. World War II effectively ceased bottomfish fishing in Hawaii, but by the late 1940s vessels were again plying the waters of the MHI and the NWHI in search of bottomfish. By the 1980s, Hawaii's bottomfish markets were paying premium prices and vessel participation in the MHI peaked at 583 in 1985. Although the average price of bottomfish has remained relatively stable since the mid-1980s (see Section 3.4.4.4), the number of vessels participating in the MHI bottomfish fishery has decreased since then as has their CPUE (see Sections 3.4.4.1 and 3.4.4.3).

4.8.2 Past Bottomfish Management Actions Potentially Contributing to Cumulative Effects

In 1986, the Bottomfish FMP was implemented to manage bottomfish fisheries of the Western Pacific Region. The Bottomfish FMP established a list of MUS as well as prohibited destructive fishing techniques (e.g. explosives, trawl nets, poisons). In 1989, the Council developed regulations under the FMP that divided the fishing grounds of the Hawaii Archipelago in following three bottomfish management sub-areas: (a) Hoomalu Zone, (b) Mau Zone, and (c) MHI (See Figure 1). Limited access programs were established for the Hoomalu Zone and Mau Zone in 1988 and 1999, respectively, to avoid "economic overfishing" (Pooley 1993b; Western Pacific Regional Fishery Management Council 1998b).

In 1998, concerns about decreasing catch rates led the State of Hawaii to close certain areas around the MHI to bottomfish fishing, including areas of Penguin Bank within waters of federal jurisdiction (i.e. the 3 to 200 nm offshore; EEZ). In addition, the State of Hawaii established a recreational bag limit of five onaga or ehu, or a mix of both, per day per (recreational) fisherman.

On December 4, 2000, President Clinton issued E.O. 13178, establishing the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (Reserve). The executive order was revised and finalized by E.O. 13196, issued January 18, 2001. In establishing the Reserve, the executive orders set forth a number of conservation measures, including the creation of Reserve Preservation Areas in which commercial fishing is prohibited unless otherwise specified.⁵ The executive orders also directed NOAA's National Marine Sanctuary Program to undergo a process (pursuant to the National Marine Sanctuaries Amendments Act of 2000) to designate the Reserve area (generally 3 to 50 nm offshore around the NWHI) as the nation's fourteenth national marine sanctuary.

On September 29, 2005, Hawaii Governor Linda Lingle signed administrative rules (Chapter 13 60.5; Department of Land and Natural Resources) to establish all state waters (0 to 3 nm offshore) in the NWHI as a marine refuge. The rules set aside 100 percent of state waters from extractive uses, including commercial and recreational fishing, and require an entry permit for all other activities.

4.8.3 Reasonably Foreseeable Future Council, NMFS, and State of Hawaii Activities

4.8.3.1 Hawaii Bottomfish Stock Assessment

In the spring of 2006, the NMFS' Pacific Islands Fisheries Science Center will conduct a new stock assessment for the bottomfish MUS complex of the Hawaiian Islands. The new stock assessment will rely heavily on the information collected by the State of Hawaii's Division of Aquatic Resource commercial marine license catch reporting program. At this point, it is uncertain if the new stock assessment will require further reductions in bottomfish fishing effort or mortality.

4.8.3.2 Hawaii Archipelago Fishery Ecosystem Plan (FEP)

The Council is currently developing place-based Fishery Ecosystem Plans (American Samoa Archipelago FEP, Hawaii Archipelago FEP, Mariana Archipelago FEP, Pacific Pelagic FEP, and Pacific Remote Island Area FEP) for areas within the Western Pacific Region. These plans provide the institutional structure from which future fishery ecosystem management decisions will be built. As ecosystem science in the region progresses, the development and utilization of ecosystem indicators and models are likely to be powerful tools for fishery ecosystem management. In addition, the Council shift toward a place-based approach will rely on enhanced opportunities for communities to participate in management (e.g. monitoring, cooperative research).

⁵ The executive orders include provisions that allow commercial bottomfish fishing and commercial and recreational trolling for pelagic species within portions of the Reserve Preservation Areas around certain islands and banks.

4.8.3.3 Hawaii Archipelago Ecosystem Research Plan

The Pacific Islands Fisheries Science Center (PIFSC) is leading an effort to develop a plan that will guide ecosystem research in the Hawaii Archipelago well into the future. The plan that is currently in preparation is likely to address ecosystem issues including the following: connectivity; invasive species; resource utilization; indicators of change (biological and physical); ecosystem modeling and forecasting; and ecosystem sustainability, resilience, and recovery. PIFSC is collaborating with the following organizations on the development of the research plan: Hawaii Institute of Marine Biology, NOAA's National Marine Sanctuary Program, State of Hawaii, U.S. Fish and Wildlife Service, University of Hawaii, and the Council. The research plan is expected to be available for public review by summer 2006.

4.8.3.4 State of Hawaii Bottomfish Restricted Fishing Areas

HDAR is currently evaluating its existing 19 bottomfish RFAs that are scattered throughout the state and has produced a proposal to modify and consolidate the existing closed areas (see Section 2.2.2 and Appendix 3). The proposed fifteen bottomfish restricted fishing areas would reduce fishing mortality by at least 15 percent. The proposed areas are distributed statewide and encompass state and federal waters. An amended Hawaii Administrative Rule to establish the modified closed areas is expected as early as the end of 2006.

4.8.3.5 NWHI National Marine Sanctuary

The National Marine Sanctuary Program is currently developing a Draft EIS and draft management plan for the proposed NWHI sanctuary. Although scientifically, the small NWHI bottomfish fishery is believed to have little impact on Hawaii's bottomfish overfishing problem, as well as minimal impacts to the greater NWHI coral reef or deep slope ecosystems, NOAA is currently contemplating the amount fishing, if any, is appropriate for the pending NWHI National Marine Sanctuary. Based on a January 19, 2006 letter from VADMR Conrad Lautenbacher, NOAA Administrator, the Council was provided an opportunity to recommend commercial and recreational fishing regulations under the MSA for bottomfish and pelagic fisheries that operate within the boundaries of the proposed NWHI sanctuary. At its 131st meeting (March 13 to 16, 2006), the Council recommended a limit of 14 commercial bottomfish permits for the NWHI (7 for the Mau Zone and 7 for the Hoomalu zone), and a bottomfish harvest limit of 391,850 pounds, which represents 85 percent of the NWHI bottomfish maximum sustainable yield. At this time, it is unknown whether fishing (commercial or recreational) will be allowed within the NWHI sanctuary.

4.8.4 Cumulative Effects to Target Species

Past Management Actions

The past management actions (i.e. catch reports, closed areas, catch limits, and limited entry) have all served to increasingly regulate the bottomfish fisheries in Hawaii and thus can be viewed as positive actions for the sustainability of Hawaii's archipelagic bottomfish multi-

species stock complex. However, as indicated in the purpose and need of this DSEIS, Hawaii bottomfish resources are experiencing overfishing; thus, further management action to reduce fishing effort on the stocks is required.

Reasonably Foreseeable Future Federal Actions

The future actions identified in Section 4.8.3 could positively impact target species as they involve possible actions taken to gain a better understanding of the life histories and status of bottomfish resources, the human utilization of such resources, and the ecosystem effects from the harvest of bottomfish species in Hawaii.

External Factors Potentially Impacting Target Species

External factors (outside of bottomfish management actions) that may have positive or negative direct, indirect, or cumulative effects on bottomfish resources include the following: (a) habitat degradation from sedimentation, (b) pollution, (c) vessel fuel prices (higher prices may result in shift from trolling to bottomfish fishing), (d) market (i.e. supply and demand) variability in price per pound as well as quantity of imported fish, (e) degradation of Hawaii's boat ramps, and (f) artificial habitat.

It is uncertain to what degree, if any, sedimentation or pollution have negatively impacted targeted BMUS. As described in Chapter 3, bottomfish generally are associated with areas of high relief and exposure to currents that carry prey items. The extent that natural events or non-fishing related activities have increased sedimentation of high-relief areas important to bottomfish is unknown, but is not believed to be substantial (C. Kelly, personal communication). Similarly unknown is if non-fishing activities resulting in pollution have impacted bottomfish stocks. Examples of pollution are dumping of dredge material in the ocean and discharge of wastewater from cruise ships. To the extent that activities associated with sedimentation and pollution are subject to environmental regulations, their effect on target species could be avoided, minimized, or mitigated. However, an increase over current levels in sedimentation or pollution in areas where BMUS occur would likely be detrimental to discrete bottomfish stocks, but their impact on Hawaii Archipelagic bottomfish stocks is unknown.

The effect of rising fuel prices could lead to more bottomfish fishing effort as it is generally recognized that bottomfish fishing (i.e. anchoring or drifting) uses less fuel than trolling, and therefore it is less expensive (HDAR Bottomfishers's Survey 2005, unpublished data). As fuel prices in Hawaii have greatly fluctuated in the previous 6 months, their impact on fishermen is believed to be substantial. If fuel prices are extremely high, however, fishermen may decide to not go fishing at all, resulting in positive impacts to bottomfish stocks. Medium-to-high fuel prices may encourage fishermen to bottomfish rather than to troll, which might negatively impact bottomfish stocks. In relation, medium-to-high fuel prices may encourage commercial bottomfish fishermen to fish for longer periods to catch more fish to help offset costs incurred from high fuel prices. Because of the recent volatile fuel prices, their indirect impact on Hawaii Archipelagic bottomfish stocks is unknown.

As described in Chapter 3, average bottomfish prices per pound fluctuate by species, by month, by season, and by year. Therefore, market forces such as supply and demand can also indirectly impact bottomfish where high average prices could lead to increased bottomfish fishing effort, and lower prices could lead to reduced effort.

Discussions with bottomfish fishermen in recent scoping meetings yielded opinions that Hawaii's boat ramps are in disrepair and are consequently affecting fishermen's ability to launch their boats. In view of target species, this deterrent to fishing can be seen as positive as it could decrease fishing effort.

The use of artificial reefs may provide potential positive impacts to target species; however, the extent to which several coordinating agencies will be able to successfully work together to create such reefs remains to be seen.

Potential Effects of the Alternatives on Target Species

As described in Section 4.5, all of the alternatives considered with the exception of Alternative 1 (no action) are designed to reduce the excessive fishing mortality rate on the Deep 7 species of concern within the MHI by at least 15 percent of current levels. Therefore, Alternatives 2 to 5 are expected to positively impact bottomfish target stocks.

Potential Cumulative Effects on Target Species

As described above, PIFSC is in the process of conducting a new Hawaii bottomfish stock assessment, which is anticipated in the spring of 2006. Such work, however, is not expected to have any direct effect on target species. As the stock assessment has yet to be completed, the results are unknown, and its effect on the status determination of Hawaii's bottomfish stocks is also unknown. The implementation of a Hawaii Archipelago FEP will initially maintain current fishery regulations. However, future fishery management under the FEP is expected to positively impact target stocks as predicting ecosystem variability will likely play an increasingly important role in fisheries management.

The effect of a NWHI National Marine Sanctuary on target species is unknown as the amount of fishing to occur within the sanctuary is unknown. However, it is unlikely that fishing will be expanded above historical levels so the sanctuary could be viewed as contributing to positive cumulative effects on targeted species within Hawaii's bottomfish multi-species complex. The level at which external factors such as sedimentation, pollution, vessel fuel prices, and market forces potentially impact BMUS is currently unknown, but is not expected to be significant. The alternatives being considered (minus Alternative 1) are expected to reduce the excessive fishing mortality rate on the Deep 7 species of concern in the MHI. The overall cumulative effect of this and other actions described earlier on Hawaii's bottomfish multi-species stock complex is expected to be positive.

4.8.5 Nontarget Species and Bycatch

Past, Present, and Reasonably Foreseeable Federal Future Actions

The Council's Bottomfish FMP (1986) prohibits the use of explosives, poisons, trawl nets, and other destructive gears that may indiscriminately kill or capture nontarget or bycatch species. Hawaii's bottomfish fisheries only use hook and line fishing gear, which is considered to have low collateral impacts on habitat and bycatch.

The amount of nontarget species and bycatch within Hawaii's bottomfish fisheries is evaluated through two management and monitoring programs: (a) mandatory commercial catch reporting and (c) the observer program. As mentioned in Section 3.4.6.2, the State of Hawaii changed its commercial marine landings (CML) forms in 2002 to include data fields describing the number of fish released. PIFSC and the State of Hawaii have a cooperative data sharing agreement from which PIFSC is able to evaluate bottomfish catch data including nontarget species and bycatch information. The Pacific Island Regional Office's Observer Program monitored the NWHI bottomfish fishery from 1990 to 1993 and is currently monitoring the fishery since 2003.

External Factors Potentially Impacting Nontarget and Bycatch Species

One of the most important external factors regarding whether a nontarget species is retained or discarded (i.e. bycatch) is Hawaii's seafood markets. For example, the largest percentage of bycatch within the fishery is attributed to amberjack/kahala (*Seriola dumerili*). One hundred percent of kahala is discarded because of fears of ciguatera poisoning. Before the United Fishing Agency (Hawaii's primary fish auction) ceased selling kahala in 1983, nearly 72,500 pounds of kahala were landed annually in Hawaii (Dalzell, WPFMC, personal communication). Currently, the only kahala being sold in the state are ones that are farm-raised in a controlled environment and devoid of ciguatera. From the NWHI bottomfish fishery, butuguchi (*Psudeocaranx dentex*) are sometimes retained and sometimes discarded, and likely dependent on market price and when the fish was caught during the fishing trip; that is, early in the trip butuguchi may be discarded as it has poor shelf life (Section 3.4.6.2).

Potential Impacts of the Alternatives on Nontarget and Bycatch Species

As all of the alternatives (except Alternative 1) are expected to reduce bottomfish fishing effort by at least 15 percent, total catches of nontarget and bycatch species are expected to decrease proportionately. For the alternatives that deal with seasonal closures (Alternatives 3, 5a, 5b) for the Deep 7 species, depending on market demand, the targeting of uku (*Aphareus rutilans*) could increase during the closed period. The impact this could have on uku stocks is unknown, but it is not expected to be significant.

Potential Cumulative Impacts on Nontarget and Bycatch Species

Given the low amount of bycatch associated with Hawaii's bottomfish fisheries, and the fact that the largest percentage of species discarded (kahala, ulua) do not suffer from barotrauma (bloating

of the swim bladder when raised from deep depth to the surface (high to low pressure, usually resulting in fish death), the effects of the alternatives added to the effects of market forces are not expected to negatively impact nontarget and bycatch species.

4.8.6 Protected Species

Marine Mammals

Hawaiian monk seals and bottlenose dolphins are the only species of marine mammals that have been identified as potentially impacted by Hawaii's bottomfish fisheries. For this reason, the cumulative impacts on those species are considered in this analysis.

Hawaiian Monk Seal

Past Federal Management Actions

The Bottomfish FMP (1986) and its amendments have established management measures to prevent, minimize, or mitigate interactions with protected species, especially the Hawaiian monk seal. For example, the Bottomfish FMP requires new Mau Zone or Hoomalu Zone permit holders to complete a protected species workshop to learn on ways to best avoid interactions. Recently, bottomfish permit holders have voluntarily agreed to attend protected species workshops conducted by NMFS, as well as agreed to a voluntary fish retention program to reduce the possibility of Hawaiian monk seals following their fishing vessels. The Bottomfish FMP also allows the NMFS Regional Administrator to place observers on NWHI bottomfish vessels, which occurred from 1990 to 1993 and from 2003 to present. The NWHI limited entry programs under the Bottomfish FMP limited the number of vessels that could participate in the fishery, which thereby decreases the overall potential for interactions with protected species in the NWHI.

Future Federal Management Actions

No management actions are being considered or planned by the Council or NMFS that may negatively impact Hawaiian monk seals or their critical habitat. The PIFSC will continue its efforts to monitor the Hawaiian monk seal population, and the PIRO will continue efforts to mitigate interactions between humans and Hawaiian monk seals.

External Factors Potentially Impacting Hawaiian Monk Seals

A comprehensive discussion on the external factors affecting Hawaiian monk seals is provided in Section 3.3.1.3 of the Bottomfish FEIS (2005). The external factors discussed include natural occurrences such as male aggression and mobbing, shark predation, disease, ecosystem productivity regime shifts, as well as anthropogenic sources such as sea wall entrapments, hookings, research activities, marine debris, and vessel groundings.

Potential Effects of the Alternatives on Hawaiian Monk Seals

In 2002, NMFS found that Hawaii's bottomfish fishery is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the destruction or adverse modification of its critical habitat (NMFS 2002). NMFS made these findings because the bottomfish fishery is expected to result in low rates of hooking and seemingly low levels of competition for fishery resources between monk seals and the bottomfish fishery. As the alternatives considered in the DSEIS would either maintain the status quo, or reduce effort of bottomfish fishing in the MHI, none of the alternatives are expected to jeopardize the continued existence of the Hawaiian monk seals or result in the destruction or adverse modification of their critical habitat.

Potential Cumulative Effects on Hawaiian Monk Seals

The Hawaiian monk seal population is far below historic levels and has declined $1.1 \text{ percent yr}^{-1}$ on average for the past decade (NMFS 2004). NMFS has concluded that the Hawaiian monk seal total abundance is too small to protect this species from extinction in the foreseeable future (NMFS 2002). Further declines of this species may be linked to the various external factors mentioned above; however, it does not appear that Hawaii's bottomfish fisheries will play a significant role in the future status of this species. NMFS will continue to monitor monk seal populations as well as monitor for any signs of impact on monk seals from Hawaii's bottomfish fisheries.

Bottlenose Dolphins

Past, Present, and Reasonably Foreseeable Federal Actions

From 1990 to 1993 and from 2003 to present, the NWHI bottomfish fishery has been observed by NMFS' observer program. A main objective of NMFS' observer program is to monitor fisheries for interactions with protected species. As mentioned in Section 3.3, between 1990 and 1993 NMFS' NWHI bottomfish observer program observed bottlenose dolphins stealing hooked fish off bottomfish lines. Interaction rates between dolphins and the NWHI bottomfish fishery have been estimated based on observer coverage conducted from 1990–1993, and indicate that an average of 2.67 dolphin interactions, most likely involving bottlenose and rough-toothed dolphins, occurred for every 1,000 fish brought on board (Kobayashi and Kawamoto 1995). These interactions did not involve hookings or entanglements, but involved dolphins stealing hooked fish or bait of bottomfish lines. Between 1994 and 2002, two bottlenose dolphins were observed hooked or entangled in the Hawaii-based longline fishery outside of U.S. EEZ waters (Forney 2004).

Hawaii's bottomfish fisheries have not been found to cause mortality or serious injury to bottlenose dolphins and therefore have been classified by NMFS as a Category III fishery under the Marine Mammal Protection Act.

External Factors Potentially Impacting Bottlenose Dolphins

Because exogenous factors on bottlenose dolphins in Hawaii have not been readily identified, for the purposes of this analysis, exogenous factors identified as common to cetaceans are used and include the following: (a) incidental take in fisheries; (b) ship traffic, ship disturbance, and ship noise, and (c) marine debris and wastes disposal.

Incidental Take in Fisheries

Nearshore gillnet fisheries in Hawaii have been reported that interact with bottlenose dolphins; however, the rate of interactions or severity of interactions is not well known (Forney 2004).

Ship Traffic, Disturbance, and Anthropogenic Noise

Collisions with vessels and disturbance from low-frequency noise are potential threats to cetaceans. The increasing levels of anthropogenic noise in the world's oceans may have an adverse effect on marine mammals. The Marine Mammal Commission is currently assessing the acoustic impact of underwater sound on marine mammals, and will likely release a report sometime in 2006.¹⁵

Marine Debris and Waste Disposal

Activities that may have adverse effects on marine mammal habitat include the dispersal of marine debris, large oil spills, and other types of marine pollution. Petroleum has the potential to be toxic to marine mammals if it is inhaled, ingested, or absorbed through the skin, mucous membranes, or eyes, or if it inhibits feeding by fouling the baleen plates of whales. Hydrocarbons can also bioaccumulate in zooplankton and fish eaten by marine mammals and other wildlife. Any detrimental effects of marine pollution on their prey species would also affect marine mammals. Aside from large, catastrophic spills, the long-term effects of low levels of petroleum exposure are unknown.

Marine debris can be toxic to marine mammals if ingested or it can entangle them, leading to decreased ability to breathe, feed, breed, swim, or haul out. The animals affected may be more vulnerable to predators or diseases, thus reducing their ability to survive, care for their young, and reproduce. These factors can have significance in local areas where there are high concentrations of marine debris, thus contributing to cumulative effects on marine mammals.

Potential Effects of the Alternatives on Bottlenose Dolphins

As discussed earlier, Hawaii's bottomfish fisheries have not been found to cause mortality or serious injury to bottlenose dolphins and therefore have been classified by NMFS as a Category III fishery under the Marine Mammal Protection Act. As Alternative 1 would maintain the status quo, and the other alternatives would reduce fishing effort in the MHI bottomfish fishery, the alternatives considered in this DSEIS are not expected to significantly impact bottlenose dolphins.

¹⁵ <http://www.mmc.gov/sound/>

Potential Cumulative Effects on Bottlenose Dolphins

The potential cumulative effects on bottlenose dolphins mostly involve impacts associated with external factors. As the Hawaii bottomfish fisheries have not been found to hook or entangle bottlenose dolphins, these fisheries are unlikely contributing to cumulative impacts on bottlenose dolphins.

Sea Turtles

As discussed in Section 4.3, interactions between sea turtles and Hawaii's bottomfish fisheries have not been reported or observed, and therefore it is surmised that bottomfish fishing operations do not adversely affect sea turtles. For this reason, the cumulative impact to sea turtles is not further discussed in this analysis. For a complete discussion on cumulative impacts to sea turtles, see the 2001 FEIS on the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region, which is available on the Council's website at www.wpcouncil.org.

Seabirds

Historically, the only types of birds that have interacted with fisheries managed under Council FMPs have been boobies and albatrosses. Although many other species of seabirds exist in Hawaii and Western Pacific Region, this analysis is limited to these two species.

Past, Present, and Reasonably Foreseeable Federal Actions

From 1990 to 1993 and from 2003 to the present, the NWHI bottomfish fishery has been observed by NMFS' observer program. A main objective of NMFS' observer program is to monitor fisheries for interactions with protected species. Prior to 1999, the Hawaii-based pelagic longline fisheries managed under the Council's Pelagics FMP were estimated to interact with around 2,000 albatross (black-footed and Laysan), primarily in the shallow-set fishery that targets swordfish. The short-tailed albatross, which is listed as endangered under the ESA, is thought to forage in areas where the Hawaii-based longline vessels fish. However, no interactions between the short-tailed albatross and the Hawaii-based longline fleet have ever been reported or observed. Between 1999 and 2003, the shallow-set component of the Hawaii-based longline fishery was not in operation, and in those years seabird interactions were lower than they were prior to 1999. In 2005, the Council amended the Pelagics FMP to require Hawaii-based longline vessels to use known seabird mitigation measures that are expected to reduce seabird interaction rates by at least 95 percent of pre-1999 levels.

External Factors Potentially Impacting Seabirds

Exogenous factors known to impact seabird populations include the following: a) degradation of nesting habitats that include lead and other toxins (e.g. polychlorinated biphenyls) left over from military activities in the NWHI, as well as invasive species such as rats that consume seabird eggs, and b) marine debris and plastics—albatross often consume floating plastics and pass the objects on to chicks while feeding. Non-U.S. pelagic longline fisheries are also likely to be an

external factor substantially impacting seabird populations. However, detailed estimates are unknown.

Potential Impacts of the Alternatives on Seabirds

PIRO observer data indicate that since 2003, six interactions (three boobies, one black-footed albatross, and two Laysan albatrosses) have occurred between the seabirds and the NWHI bottomfish fishery. Out of the six, only one of those interactions occurred while operating bottomfish fishing gear, while the other five occurred while trolling. On the basis of these figures, bottomfish fishing in the NWHI constitutes a negligible risk to seabirds in the NWHI as populations of these seabirds in the NWHI range from tens of thousands (boobies, black-footed albatross) to hundreds of thousands (Laysan albatross; NMFS 2005). As seabird populations are substantially higher in the NWHI than in the MHI, and no interactions between seabirds and bottomfish fishing gear have ever been observed or reported in the MHI, the alternatives considered in this DSEIS are believed to pose no additional threat to seabird populations.

Potential Cumulative Effects on Seabird Populations

As Hawaii's bottomfish fisheries pose a negligible threat to seabird populations, maintaining their current populations or rebuilding those populations that were once substantially greater will depend on to what extent external factors impacting seabirds are reduced or mitigated.

4.8.7 EFH, Biodiversity, and Ecosystems

Past Federal Actions

Pursuant to the 1996 Sustainable Fishery Act amendments to the MSA, the Council has designated EFHs and HAPCs for each MUS listed under the Council's five FMPs (64 FR 19068; see Section 3.3.1). The Council and NMFS must ensure that any activities conducted in such areas do not adversely affect, to the extent possible, EFH or HAPC for any MUS. The use of explosives, poisons, trawl nets, and other destructive gears that may adversely affect any EFH or HAPC in the Western Pacific Region are prohibited under the Council's FMPs. No fishery under Council management or jurisdiction has been found to adversely affect the EFH or HAPC of any Western Pacific Region MUS.

Reasonably Foreseeable Future Federal Actions Potentially Affecting EFH, Biodiversity, and Ecosystems

There are no actions being planned by the Council or NMFS that are expected to adversely affect EFH or HAPC in the Western Pacific Region. The Council has begun a process to develop and implement place-based FEPs for areas within its jurisdiction. Future fishery ecosystem management actions will build upon the place-based FEPs framework and incorporate ecosystem management approaches (e.g. multi-species management, ecosystem indicators and models, and community-based management) as appropriate.

External Factors or Actions Potentially Affecting EFH, Biodiversity, and Ecosystems

External factors or actions that may potentially impact bottomfish EFH, biodiversity, and ecosystems are land-based pollution and sedimentation, ocean drilling and mining, vessel wastes, vessel groundings, oil spills, ocean dumping of toxic wastes, marine debris including derelict fishing gear, and military exercises with live ammunition. To what degree these past actions have had on bottomfish EFH, biodiversity, or ecosystems are unknown, but they are suspected to be minimal. To the extent that these or potential activities and events are subject to environmental regulations, their effects on EFH, biodiversity, and ecosystems are likely to be avoided, minimized, or mitigated.

Potential Effects of the Alternatives on EFH, Biodiversity, and Ecosystems

Submersible surveys conducted on bottomfish fishing areas in the NWHI found that bottomfish fishing operations have negligible effects on EFH, biodiversity, and the benthic ecosystem. None of the alternatives considered in this DSEIS would modify the existing regulations prohibiting the destructing fishing methods. Fishing vessel activities can produce potential negative environmental impacts from lost oil, sewage, garbage and debris, and groundings. However, none of these factors are believed to have occurred and resulted in significant negative impacts on EFH, biodiversity, or benthic ecosystems on a broad or archipelagic scale. Neither are they believed to occur frequently, thereby adversely affecting EFH and ecosystems in an additive manner. Therefore, the alternatives considered in this DSEIS are not expected to have any adverse impacts on EFH, biodiversity, and benthic ecosystems.

Potential Cumulative Effects on EFH, Biodiversity, and Ecosystems

On the basis of the above discussion, the effects of continued bottomfish fishing in Hawaii, albeit with reduced effort in the MHI over recent years, combined with external factors are not expected to result in significant negative cumulative impacts to EFH, biodiversity, and benthic ecosystems.

4.8.8 Fishery Sectors

Past Federal Management Actions

Generally, the objectives of past fisheries management measures were intended to promote sustainable fisheries and are expected to have positive impacts on fishery participants in the long-term from the benefit of maintained fishing opportunities. Nevertheless, it is believed that many fishermen in Hawaii have the sense that government regulations are “boxing them in” and reducing their ability to maintain their characteristic highly flexible fishing strategy (Hamilton et al. 1996; Polovina and Haight 1999; Pooley 1993a). This flexibility is important for many smaller and medium-sized fishing operations because of the way natural rhythms and variability influence the occurrence and season availability of various targeted species.

Reasonably Foreseeable Future Federal Management Actions

Fisheries management is an adaptive process, and fisheries management decisions potentially affecting Hawaii's bottomfish fishery sectors could arise at any time. Currently, the Council is developing FEPs for the Western Pacific Region. Future fisheries management decisions will build upon the institutional framework of place-based FEPs. Essential to successful implementation of fisheries ecosystem management are opportunities for community participation. The Council anticipates working closely with fishing communities as well as fishery sectors in furthering fishery ecosystem management in Hawaii.

The National Marine Sanctuary Program is currently developing a Draft EIS and draft management plan for the proposed NWHI sanctuary. At this time, it is unknown whether fishing (commercial or recreational) will be allowed within the NWHI sanctuary.

As identified during public scoping, commercial bottomfish fishermen in Hawaii expressed interest in learning best practices and methods associated with seafood handling, so as to maintain a high quality product and maximize price per pound values. Dependent on Congressional funding, the Council and NMFS may coordinate seafood handling workshops for Hawaii's bottomfish fishermen.

External Factors Potentially Impacting Fishery Sectors

Fuel Costs

Perhaps the single external factor most affecting Hawaii's bottomfish fishing sectors are the volatile gas prices observed earlier in 2005. Although bottomfish fishing is considered less expensive than pelagic trolling, for many areas in Hawaii, traveling to and from bottomfish fishing grounds is still expensive considering fuel costs (HDAR Bottomfishers's Survey 2005, unpublished data). If fuel prices continue to increase, Hawaii's bottomfish fishery sectors could see more competition from fishermen switching to bottomfish fishing over trolling. As fuel prices in Hawaii have greatly fluctuated in the previous 6 months, their impact on fishermen is believed to be significant. When fuel prices are extremely high, many fishermen decide not to go bottomfish fishing or trolling (HDAR Bottomfishers's Survey 2005, unpublished data).

Seafood Imports

For Hawaii's commercial bottomfish sector, the effect of markets importing bottomfish from places such as Australia, New Zealand, Fiji, and Tonga impacts market prices for Hawaii bottomfish. As mentioned in Section 3.4.5, nearly 750,000 pounds of bottomfish are annually imported to Hawaii each year, with a strong negative correlation observed between MHI landings and imports—when MHI bottomfish landings are low, bottomfish imports increase.

Construction Jobs

An external factor that might be positively impacting Hawaii's fishing sector is a stronger Hawaii economy over recent years. Some islands in Hawaii have experienced dramatic increases

in construction jobs over the last ten years, contributing in low unemployment rates. Within the past several years, Hawaii's construction industry has boomed and so has its high-value housing market, which has likely benefited many part-time commercial bottomfish fishermen (M. Mitsuyasu, personal communication). As seen in Section 3.4.4.1, the number of MHI bottomfish vessels and the number of bottomfish fishing trips have declined in recent years. Although one cannot determine that this is directly attributable to Hawaii's construction boom, part-time commercial fishermen may not be supplementing their income with bottomfish catches as readily as in years past. The benefit to Hawaii's fishery sectors is less competition for catches at popular bottomfish grounds.

Boat Ramps and Harbors

Discussions with bottomfish fishermen in recent scoping meetings have yielded the fact that Hawaii's boat ramps and harbors are in disrepair and affect fishermen's ability to launch or berth their boats. Fishermen have stated that the dilapidated boat ramps and harbors in need of repair are found everywhere in the MHI (M. Mitsuyasu, personal communication).

Potential Impacts of the Alternatives on Fishery Sectors

Alternative 1 (no action) would likely result in further decline of catch rates, and fishery participants in all sectors would see lower returns both in financial and nonmarket (e.g. angler satisfaction, food, and social benefits) terms. Alternative 2a (area closures around Penguin and Middle Banks) would be expected to disproportionately impact Oahu and Kauai fishery sectors as compared with those on the other islands. Alternative 2b is expected to negatively affect small boat fishermen of all sectors if they are displaced from their traditional, close to home fishing grounds. Alternative 3 (seasonal closure) is not expected to significantly impact commercial, charter, and recreational (including subsistence) fishery sectors as proposed closure is during the summer months when bottomfish landings are historically the lowest.

Alternative 4a (TAC) is expected to impact all fishery sectors proportionately, unless a situation developed in which commercial fishermen increased their effort and the TAC was disproportionately caught by commercial fishermen over recreational and charter sectors. However, given that the majority of commercial landings are already made during the winter season, this is not likely to highly change these operations. Because of the lack of detailed information on recreational (including subsistence) fishing patterns, and the varying motivations within these groups, it is not known whether they would increase effort in light of a TAC. The impacts of Alternative 4b (IFQs) on the commercial fishery sector would vary depending on how its IFQs were implemented. If equal quotas (totaling 85 percent of the fleet-wide 2003 catch) were provided, highliners would get the same quota as part-time fishermen, and vice versa. This would leave some without enough quota, while others would have unused quota. Without a method to transfer (trade) quota between fishermen, this would have disproportionately adverse impacts on the highliners. If equal quotas were provided to a subset of all historical participants, such as those most active in recent years, those included would each have a higher quota, while those excluded would have none. In this case, part-time commercial fishermen that have not been active in recent years would not have IFQs and therefore would not be able to commercially sell

their fish, of which the impact could be significant. The sport and recreational (including subsistence) fishery sectors would not be impacted under this alternative.

Alternative 5a (May–September closure) would impact all fishery sectors; however, this is believed to normally be a period of lower bottomfish fishing activity due to the increased availability of pelagic fish so this impact may be relatively low. The provision of equal IFQs for use by a subset of commercial fishermen during the otherwise closed season will offset the impacts on this group. However, as discussed above, the allocation of equal quotas to each qualifying participants will likely leave some without enough quota, while others could have unused quota. Impacts on those commercial, sport, and recreational (including subsistence) fishermen who do not qualify for an IFQ would be adverse.

The impacts of Alternative 5b (June–August closure and year-around Penguin Bank partial closure) would be evenly spread across fishery sectors as it does not differentiate between commercial, sport, and recreational (including subsistence) fishermen. The year-round partial closure of Penguin Bank would disproportionately affect fishing sectors based on Oahu; however, to what degree is unknown.

Potential Cumulative Impacts on Fishery Sectors

As seen in the above discussion, the impacts of the proposed alternatives when combined with external factors suggest that Hawaii’s bottomfish fishery sectors are facing substantial cumulative impacts. To what extent these cumulative impacts have on sustained opportunities for Hawaii’s bottomfish fishery sectors remains to be seen.

4.8.9 Fishing Communities

Past, Present, and Reasonably Future Federal Actions

As described in Section 3.6.2, based on the requirements of the 1996 SFA amendments to the MSA, the Council designated under its FMPs, that each of the islands of Kauai, Niihau, Oahu, Maui, Molokai, Lanai, and Hawaii is designated as a fishing community.

External Factors Impacting Hawaii’s Fishing Communities

Hawaii’s Economy

Some islands in Hawaii have experienced dramatic increases in construction jobs over the last several years, contribution low unemployment rates in Hawaii. Because of more available jobs, fishing communities on some islands may have reduced their dependence on fisheries. However, for islands that have experienced little growth (e.g. Molokai), fishing is still a major economic and social force within the community.

Boat Ramps and Harbors

Discussions with bottomfish fishermen in recent scoping meetings have yielded that Hawaii's boat ramps and harbors are in disrepair and affecting fishermen's ability to launch or berth their boats. Fishermen have stated that the dilapidated boat ramps and harbors in need of repair are found within in each of Hawaii's fishing communities (M. Mitsuyasu, personal communication).

Fuel Costs

Hawaii's recently volatile gas prices are impacting Hawaii's fishing communities. Although bottomfish fishing is considered less expensive than pelagic trolling, for many areas in Hawaii, traveling to and from bottomfish fishing grounds is still expensive considering fuel costs (HDAR Bottomfishers's Survey 2005, unpublished data). If fuel prices continue to increase, Hawaii's fishing communities could be impacted as it could become simply too expensive to fish.

Potential Impacts of the Alternatives on Fishing Communities

The short term affects of no action by the Council under Alternative 1 are expected to impact Hawaii's fishing communities proportionately. However, the management action by the Secretary of Commerce through NMFS is unknown and therefore its impact on Hawaii's fishing communities is also unknown. Alternative 2 is expected to disproportionately affect the fishing communities of Oahu and Kauai as it would close Penguin Banks and Middle Banks to bottomfish fishing for the Deep 7 species. The effect of Alternative 2b on fishing communities is difficult to assess as Hawaii's fishing communities may respond differently to the proposed BRFAs. Loss of access to traditional fishing grounds may negatively affect fishing communities as it may deter people from going fishing, thus reducing the social benefits of fish sharing amongst the community. Loss of specialized fishing knowledge within a fishing community can also been viewed as negative as it is a reduction in social capital that is difficult to regain by future generations.

Alternative 3 is expected to proportionately impact all of Hawaii's fishing communities. However, significant impacts are not expected as the fishing season would open during the months that have historically recorded the highest bottomfish landings. Alternative 4a would affect Hawaii's fishing communities proportionately, unless there was race to fish situation whereby the TAC was consumed disproportionately by one or more fishing communities. Depending on how the IFQs are allocated under Alternative 4b, fishing communities may be affected proportionately or disproportionately; however, the impacts are not expected to be significant. Alternative 5a is not expected to impact a fishing community, even if the IFQs are not distributed evenly throughout Hawaii's fishing communities as the open season would occur during the months that bottomfish landings are historically the highest. The year-around partial closure of Penguin Banks is expected disproportionately affect Oahu's fishing community, as Penguin Banks is the primary bottomfish fishing grounds for Oahu's bottomfish fishermen.

Potential Cumulative Effects on Hawaii's Fishing Communities

The external factor of Hawaii's relatively booming economy and low unemployment rate may be offsetting the impact of rising fuel costs or the need for members of Hawaii's fishing communities to supplement their incomes or diets with catches of bottomfish. None of the alternatives are expected to significantly affect Hawaii's fishing communities; however the response of fishing communities to a seemingly increasing regulatory environment is unknown. Given rising fuel prices, increased regulations, and degraded access points (i.e. boat ramps), members of Hawaii's fishing communities are likely facing reduced fishing opportunities. Reduced fishing opportunities may impact Hawaii's fishing communities by reducing the economic and social benefits that these communities derive from fishing and the harvest of marine resources.

4.8.10 Native Hawaiian Communities

Past, Present, and Reasonably Foreseeable Future Federal Actions

The MSA attempted to address native, indigenous rights to resources managed by the Council through Section 305 (i) (2), the Western Pacific Community Development Program (CDP) Section 305 note, and the Western Pacific Community Demonstration Project Program (CDPP). The CDP provides an opportunity for the Council to make programmatic changes to fisheries it manages to address inequities in participation in these fisheries by native fishers, however, no money is appropriated for this program. The CDPP is a regional grant program for which Congress has appropriated \$500,000 per year for three to five demonstration projects by qualified native communities. These programs acknowledge that native people in the Western Pacific Region have had barriers to their full participation in fisheries managed by the Council and therefore exist to enhance their participation in fisheries.

Although the regulations have not been finalized by NMFS, the Council (1999) recommended that one fifth or 20 percent of the target number of Mau Zone limited entry permits (ten) be allocated for Native Hawaiians under the Council's CDP.

External Factors Potentially Impacting Native Hawaiians

Although there are likely other external factors affecting Native Hawaiians, two of the most common recognized are discussed below.

Diet and Health

Native Hawaiians die at younger ages than other ethnic groups residing in Hawaii; have a higher prevalence of hypertension, diabetes, and asthma than other ethnic groups; and have a higher rate of being overweight (Johnson et al. 2003). Obesity is implicated as a significant risk factor in many chronic diseases. Changing dietary behaviors to reduce obesity is a fundamental aim of most weight loss programs, including several Traditional Hawaiian Diet programs developed and tested in Hawaii over the past two decades. These programs emphasize the health and cultural values of native foods. The majority of the participants realized short-term weight loss and

improvements in health, but few individuals sustained a significant weight loss. Barriers to accessing fresh, affordable food is cited as one of the major barriers to long-term adherence to traditional Hawaiian diets. Changes that would support healthier lifestyles include “increase(d) access by Native Hawaiians to the land and ocean” and support of local food producers (Fujita et al. 2004).

Education

Native Hawaiian students are perceived, by the standards of contemporary education, to be underperformers (Pacific American Foundation/Hui Malama o Mo’omomi 2003). Personalized environments and experience-based learning have been identified as two critical factors for success in the schooling of Native Hawaiian students (Kawakami and Aton 2000). For Hawaiians, the lesson and the learning of the lesson are ultimately interwoven with the situation and the environment of the learner; that is, every situation is a learning opportunity. Western educators recognized 60 years ago that Native Hawaiians have never conceived of education in terms of schooling alone or regarded education as separate from living (Wist 1940).

Kupuna (elder) wisdom is one of the essential components of the traditional Hawaiian learning that is neglected in contemporary education (Bartram et al. 2004). Unlike modern societies they typically receive information through a variety of sources such as writing and multi-media, Native Hawaiians depend on their *kupuna* to pass on cultural wisdom.

Potential Impacts of the Alternatives on Native Hawaiians

If the Council did not take action (Alternative 1), it is probable that the Secretary of Commerce through NMFS would take unilateral action to impose management measures designed to end overfishing in federal waters. It is not possible to predict what those measures would consist of, but they would have to reduce MHI bottomfish fishing mortality (e.g. catches) by at least 15 percent to successfully end overfishing. Depending on what measures were implemented, it is unlikely that special provisions would be conceded to Native Hawaiians.

If no management action occurred by the Council or by NMFS, and the current overfishing condition led to an overfished condition resulting in significantly low bottomfish biomass levels, the bottomfish fishery would likely collapse. Under this scenario, the economic and cultural benefits observed from sustainable bottomfish resources for Native Hawaiian communities would cease, thereby negatively impacting the ability of Native Hawaiians to gain economically from catching bottomfish as well as their ability to perpetuate their cultural traditions of fishing and fish sharing amongst community members. Similarly for the remainder of the alternatives, a reduction of access rights and cultural practices can be viewed as impacting Native Hawaiians by reducing their ability to practice and continue their culture. The loss of any customary access and practice could be viewed as a permanent loss of culture for Native Hawaiian communities.

Potential Cumulative Impacts to Native Hawaiians

As mentioned above, Native Hawaiians are facing significant impacts from relatively poor diet and health and education. Bottomfish management alternatives that reduce access to locally

produced fish would add to cumulative adverse effects on Native Hawaiian diet and health as well as to further reduce fishing opportunities that allow for intergenerational teaching of Native Hawaiian youth. The cumulative effect of the proposed management alternatives in combination with the external factors is unknown, but is seemingly not positive for Native Hawaiian communities.

4.8.11 Administration and Enforcement

Past, Present, and Reasonably Foreseeable Federal Actions

The Council has been involved in managing fisheries of the Western Pacific Region since the promulgation of the MSA in 1976. Since that time, the Council has developed, and the Secretary of Commerce has approved, the following five species-based management plans: Precious Corals (1983), Crustaceans (1983), Bottomfish and Seamount Groundfish (1986), Pelagics (1987), and Coral Reef Ecosystems (2004). With the exception of the Coral Reef Ecosystems FMP, each FMP has undergone a series of amendments. In the fall of 2005, the Council underwent a process to develop and implement place-based fishery ecosystem plans, thereby amending and reorganizing the species-based FMP regulations into place-based regulations.

In 2004, Congress appropriated funds to NMFS to establish the Pacific Islands Region, whereby the fishery resources occurring in the EEZ around U.S. Pacific Islands would no longer be under the administrative purview of NMFS' Southwest Region. Also during this transformation, the Honolulu Lab became the Pacific Islands Fisheries Science Center, and the NMFS' Office of Law Enforcement Pacific Islands Division was established.

The National Marine Sanctuary Program is currently developing a Draft EIS and draft management plan for the proposed NWHI sanctuary. At this time, it is unknown whether fishing (commercial or recreational) will be allowed within the NWHI sanctuary. If fishing is allowed in the NWHI sanctuary, it is unknown what agency will manage and administer such activity and under what authority (i.e. MSA vs. NMSA).

External Factors Potentially Impacting Administration and Enforcement

External factors that potentially impact Council and NMFS management and administration are new legislation, annual budgets, and litigation. External factors potentially affecting NMFS Office of Law Enforcement include annual budgets and balancing enforcement priorities. Exogenous factors that impact the USCG include shifting priorities for which Homeland Security, search and rescue, as well as annual budgets impacting staffing and the maintenance and acquisition of assets are included.

Potential Impacts of the Alternatives on Administration and Enforcement

Alternative 1 (no action) would not impact administration and enforcement in the short term; however, no action in the long term could result in litigation or failure to manage bottomfish in a sustainable manner. The area closures under Alternatives 2a and 2b would not significantly impact administration, although it requires the promulgation of area closure regulations.

Alternatives 2a and 2b, however, would significantly impact enforcement agencies as adequate enforcement of the measure would entail at-sea or air surveillance operations. Alternative 3 would insignificantly impact administration as it would entail new regulations to be promulgated reflecting the closed season. Enforcement agencies would not be significantly impacted as enforcement during the closed season would mostly involve shore-based monitoring of landings and sales of the Deep 7 bottomfish species of concern. Alternatives 4a, 4b, and 5a would impact administration and enforcement as they would entail careful monitoring of fish catch data and an appropriate enforcement response. Alternative 5b would not significantly impact administration as it would entail seasonal and partial closure. However, enforcement agencies may be impacted as they would need to monitor the area closure by sea or by air.

Potential Cumulative Impacts to Administration and Enforcement

From the above discussion, the impacts of the management actions considered in this DSEIS, and taken in combination with past, present, and reasonably future Council and NMFS actions as well as external factors such as Congressional funding, are not expected to significantly impact administration and enforcement. However, as more and marine resource regulations are implemented and more closed areas are established, the responsibilities of the USCG and NMFS OLE also increase. This could be burdensome, especially if these enforcement agencies are forced to operate on budgets that do not account for added marine resource enforcement responsibilities. In other words, unfunded mandates can significantly burden enforcement agencies tasked with multiple missions (e.g. USCG and Homeland Security).